

## FILE HISTORY

US 7,254,621

PATENT: 7,254,621

INVENTORS: Singhal, Sandeep Kishan  
Levinson, Barry Eliot  
Sanders, Darren Michael

TITLE: Technique for enabling remote data access  
and manipulation from a pervasive device

APPLICATION NO: US200575437A

FILED: 07 MAR 2005

ISSUED: 07 AUG 2007

COMPILED: 12 JUL 2012


7,254,621


**TECHNIQUE FOR ENABLING REMOTE DATA ACCESS AND  
MANIPULATION FROM A PERVASIVE DEVICE**

**Transaction History**

<b>Date</b>	<b>Transaction Description</b>
03-07-2005	Initial Exam Team nn
03-27-2005	IFW Scan & PACR Auto Security Review
04-06-2005	Cleared by OIPE CSR
04-11-2005	Corrected Paper
04-11-2005	Application Return TO OIPE
04-11-2005	Application Return from OIPE
04-11-2005	Application Is Now Complete
04-11-2005	Application Return TO OIPE
04-11-2005	Application Dispatched from OIPE
04-11-2005	Application Is Now Complete
06-09-2005	Applicant has submitted new drawings to correct Corrected Papers problems
06-17-2005	Application Return from OIPE
06-17-2005	Application Is Now Complete
07-29-2005	Transfer Inquiry to GAU
10-03-2005	Information Disclosure Statement considered
10-03-2005	Information Disclosure Statement (IDS) Filed
10-03-2005	Information Disclosure Statement (IDS) Filed
10-03-2005	Reference capture on IDS
10-12-2005	IFW TSS Processing by Tech Center Complete
09-21-2006	Case Docketed to Examiner in GAU
01-02-2007	Non-Final Rejection
01-08-2007	Email Notification
01-08-2007	Mail Non-Final Rejection
01-10-2007	Electronic Review
01-26-2007	Terminal Disclaimer Filed
01-26-2007	Response after Non-Final Action
02-02-2007	Date Forwarded to Examiner
02-03-2007	PARALEGAL OR ELECTRONIC TERMINAL DISCLAIMER APPROVED
02-03-2007	Notification of Terminal Disclaimer - Accepted
04-17-2007	Document Verification
04-17-2007	Notice of Allowance Data Verification Completed
04-20-2007	Mail Notice of Allowance
04-20-2007	Mail Notification of Terminal Disclaimer - Accepted
04-21-2007	Email Notification
04-26-2007	Electronic Review
07-02-2007	Issue Fee Payment Verified

07-02-2007	Issue Fee Payment Received
07-03-2007	Application Is Considered Ready for Issue
07-09-2007	Dispatch to FDC
07-18-2007	Issue Notification Mailed
08-07-2007	Recordation of Patent Grant Mailed
08-07-2007	Patent Issue Date Used in PTA Calculation

<b>Issue Classification</b> 	<b>Application/Control No.</b>	<b>Applicant(s)/Patent under Reexamination</b>	
	11/075,437	SINGHAL ET AL.	
	<b>Examiner</b>	<b>Art Unit</b>	
	Moustafa M. Meky	2157	

ISSUE CLASSIFICATION											
ORIGINAL					CROSS REFERENCE(S)						
CLASS		SUBCLASS			CLASS	SUBCLASS (ONE SUBCLASS PER BLOCK)					
709		218			709	217					
INTERNATIONAL CLASSIFICATION											
G	0	6	F	15/16							
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<div>(Assistant Examiner) (Date)</div> <div>(Legal Instruments Examiner) (Date)</div>					<div> MOUSTAFI M. MEKY PRIMARY EXAMINER 4/12/2007 (Primary Examiner) (Date)</div>			Total Claims Allowed: 24			
								O.G. Print Claim(s) 1	O.G. Print Fig. 1		

<input checked="" type="checkbox"/> Claims renumbered in the same order as presented by applicant										<input type="checkbox"/> CPA		<input type="checkbox"/> T.D.		<input type="checkbox"/> R.1.47	
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# Index of Claims



Application/Control No.

11/075,437

Examiner

Moustafa M. Meky

Applicant(s)/Patent under Reexamination

SINGHAL ET AL.

Art Unit

2157

✓	Rejected
=	Allowed

—	(Through numeral) Cancelled
+	Restricted


N	Non-Elected
I	Interference

A	Appeal
O	Objected

Claim		Date									
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<b>Index of Claims</b>		Application/Control No.		Applicant(s)/Patent under Reexamination	
		11/075,437		SINGHAL ET AL.	
		Examiner		Art Unit	
		Moustafa M. Meky		2157	

√ Rejected

= Allowed

— (Through numeral) Cancelled

+ Restricted

N Non-Elected

I Interference

A Appeal

O Objected

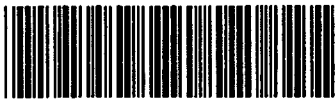
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U.S. Patent and Trademark Office


Part of Paper No. 20070412

<b>Search Notes</b> 		<b>Application/Control No.</b> 11/075,437	<b>Applicant(s)/Patent under Reexamination</b> SINGHAL ET AL.	
		<b>Examiner</b> Moustafa M. Meky	<b>Art Unit</b> 2157	

SEARCHED			
Class	Subclass	Date	Examiner
709	200-203	12/29/2006	MMM
709	217-227	12/29/2006	MMM

INTERFERENCE SEARCHED			
Class	Subclass	Date	Examiner

SEARCH NOTES (INCLUDING SEARCH STRATEGY)		
	DATE	EXMR
WEST(ALL FILES0	12/29/2006	MMM

<b>Search Notes</b> 	<b>Application/Control No.</b> 11075437	<b>Applicant(s)/Patent Under Reexamination</b> SINGHAL ET AL.
	<b>Examiner</b> Meky, Moustafa M	<b>Art Unit</b> 2157

SEARCHED			
Class	Subclass	Date	Examiner
UPDATE		4/12/2007	MMM

SEARCH NOTES		
Search Notes	Date	Examiner
WEST(ALL FILES)	4/12/2007	MMM

INTERFERENCE SEARCH			
Class	Subclass	Date	Examiner
709	218	4/12/2007	MMM
709	217	4/12/2007	MMM



WEST Search History

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END OF SEARCH HISTORY

11|075,437

WEST Search History

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<input type="checkbox"/>	L5	l3 or L4	134578
<input type="checkbox"/>	L4	manipulat\$4 near5 (operation or service or task)	47835
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<input type="checkbox"/>	L2	L1 or pda	853668
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END OF SEARCH HISTORY

11/075437



US007254621B2

(12) **United States Patent**  
**Singhal et al.**

(10) **Patent No.:** **US 7,254,621 B2**  
(45) **Date of Patent:** **\*Aug. 7, 2007**

(54) **TECHNIQUE FOR ENABLING REMOTE DATA ACCESS AND MANIPULATION FROM A PERVERSIVE DEVICE**

(75) Inventors: **Sandeep Kishan Singhal**, Englewood Cliffs, NJ (US); **Barry Eliot Levinson**, New York, NY (US); **Darren Michael Sanders**, Nanuet, NY (US)

(73) Assignee: **Symantec Corporation**, Cupertino, CA (US)

(\*) Notice: Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 246 days.

This patent is subject to a terminal disclaimer.

(21) Appl. No.: **11/075,437**

(22) Filed: **Mar. 7, 2005**

(65) **Prior Publication Data**  
US 2005/0216492 A1 Sep. 29, 2005

**Related U.S. Application Data**  
(63) Continuation of application No. 09/848,394, filed on May 3, 2001, now Pat. No. 6,925,481.

(51) **Int. Cl.**  
**G06F 15/16** (2006.01)

(52) **U.S. CL.** ..... **709/218; 709/217**  
(58) **Field of Classification Search** ..... **709/200-203, 709/217-227**

See application file for complete search history.

(56) **References Cited**

**U.S. PATENT DOCUMENTS**

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2005/0113139	A1 *	5/2005	Boss et al.	455/558

\* cited by examiner

*Primary Examiner*—Moustafa M. Meky

(74) *Attorney, Agent, or Firm*—Fenwick & West LLP

(57) **ABSTRACT**

Methods, systems, and computer program instructions for enabling users of pervasive devices to remotely access and manipulate information in ways that might otherwise be impossible or impractical because of inherent limitations of the device. The disclosed techniques enable a wide variety of data manipulation operations to be performed on behalf of the pervasive device, for a wide variety of content types. In preferred embodiments, no modifications or add-ons are required to the pervasive device.

**24 Claims, 9 Drawing Sheets**

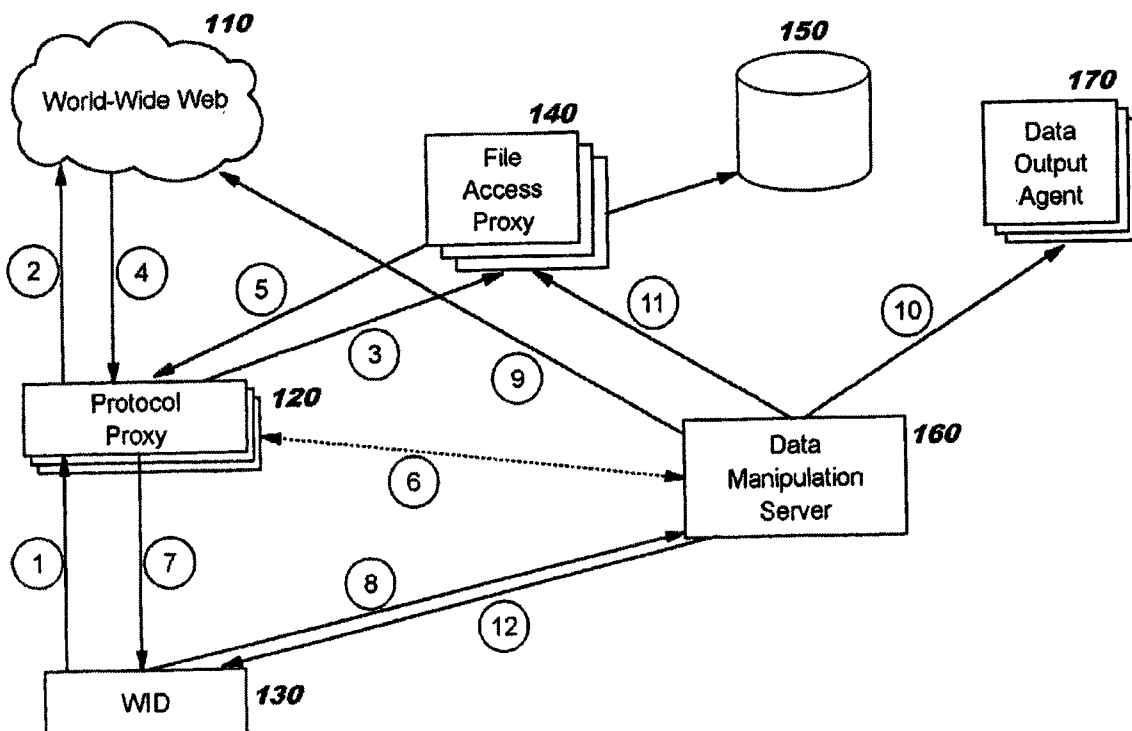


FIG. 1

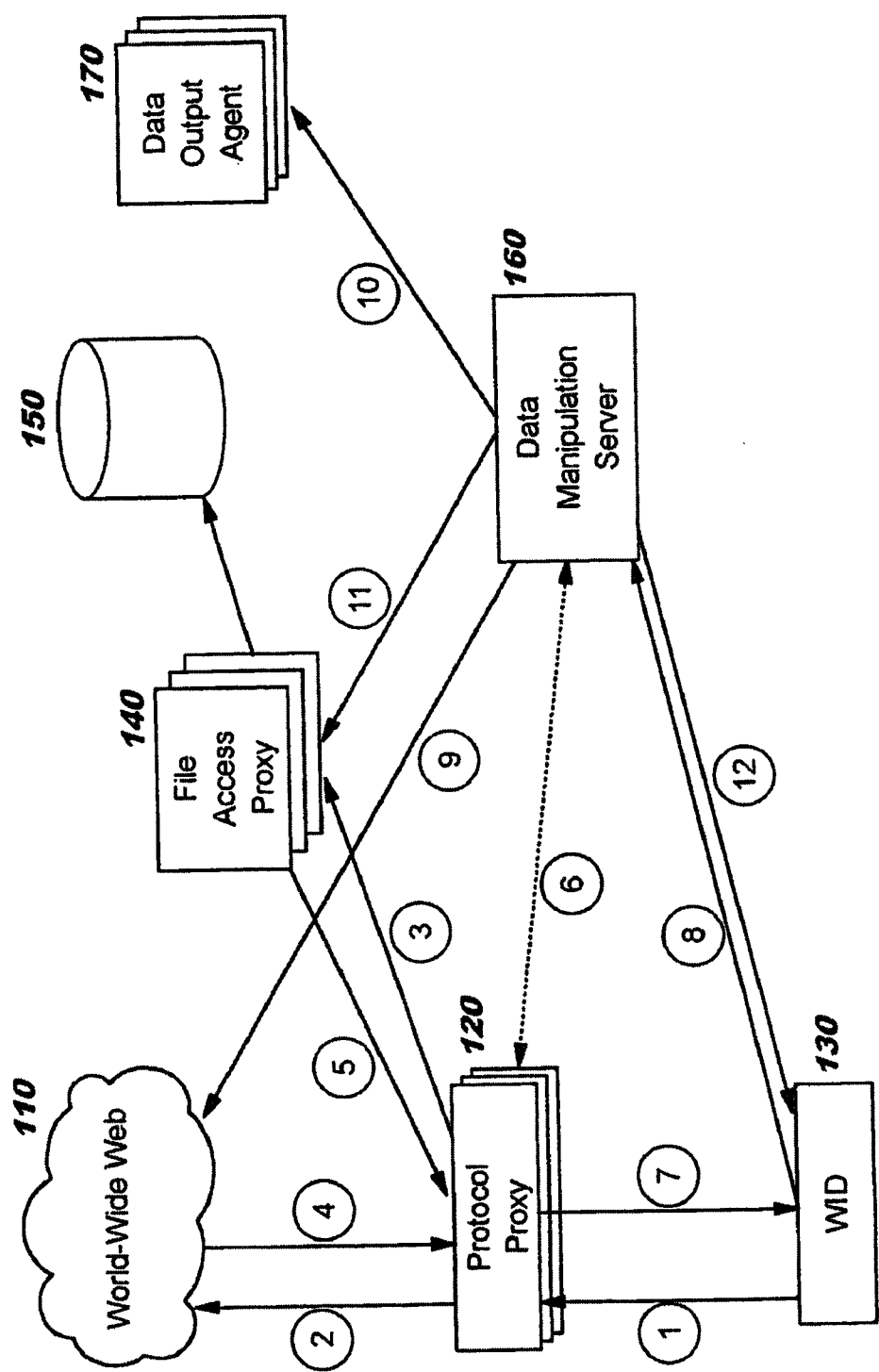


FIG. 2A

	200	201	202
205	XML	convert to WBXML	DataManipulationServer/convert
210	XML	fax to recipient	DataManipulationServer/fax
215	ASCII	send as e-mail	DataManipulationServer/email

FIG. 2B

	250	251	252	253	254
255	*	A	*	print	DataManipulationServer/print
260	.doc	B	Conference Room C	print	DataManipulationServer/print

FIG. 3

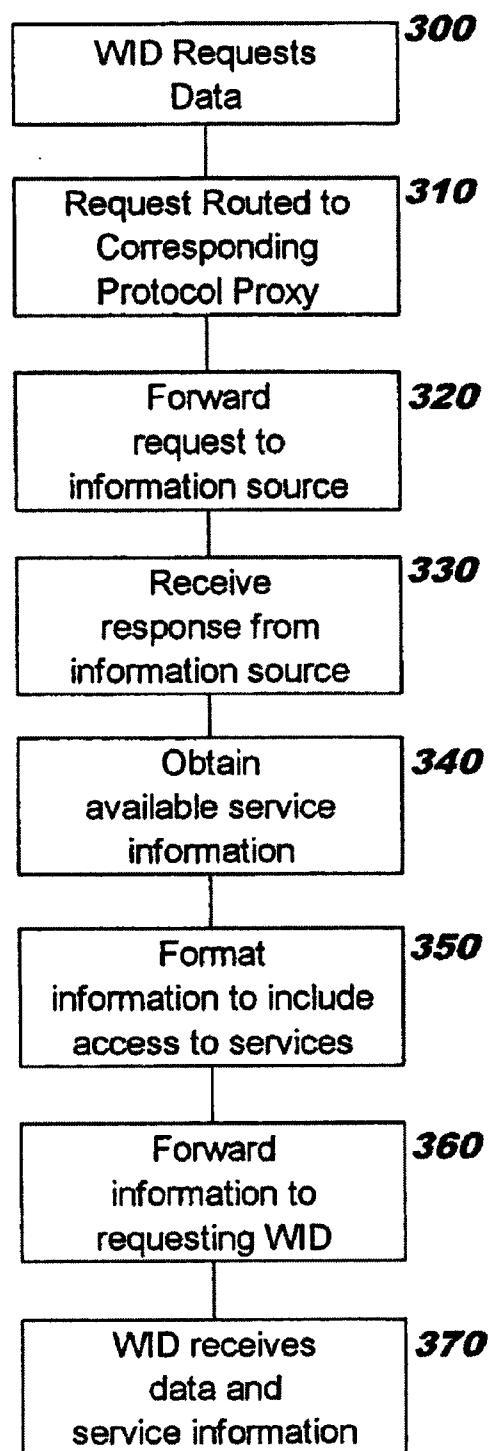


FIG. 4

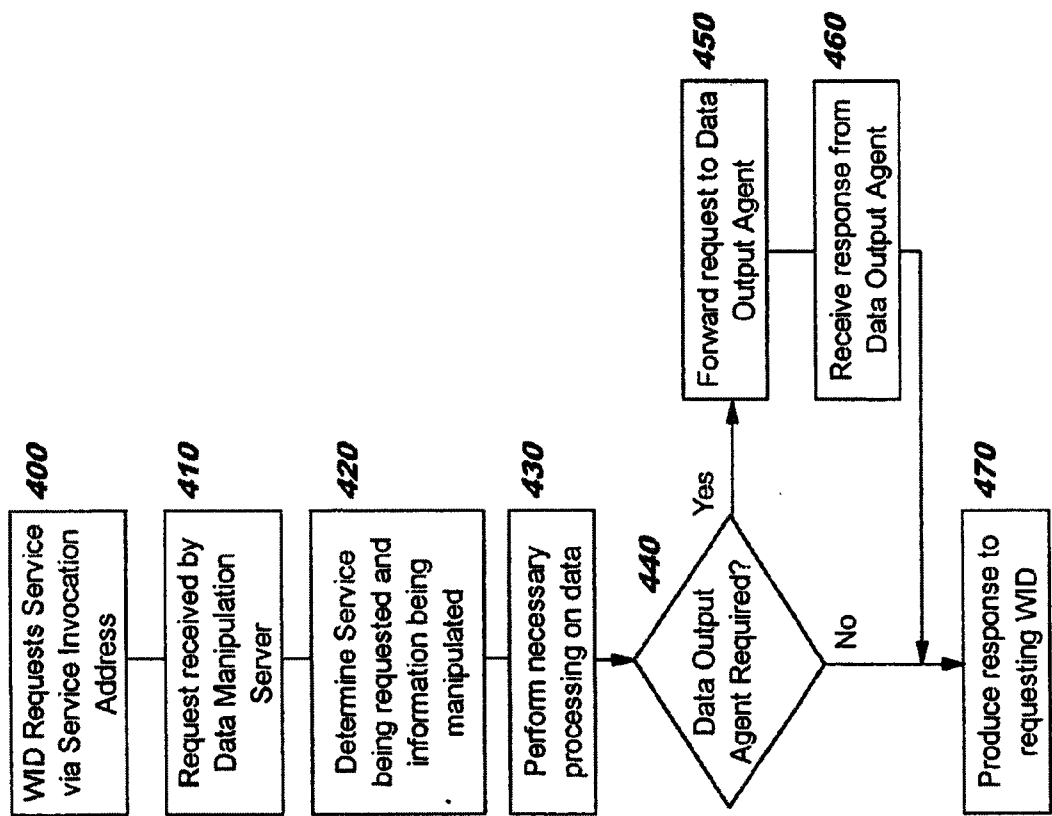


FIG. 5A

<http://DataManipulationServer/print>

FIG. 5B

[?url=http://www.reefedge.com](http://www.reefedge.com?url=http://www.reefedge.com)

FIG. 5C

<http://DataManipulationServer/print?url=http://www.reefedge.com>



FIG. 5D

<http://DataManipulationServer/print?file=//fileServer/report.doc>

FIG. 5E

<http://DataManipulationServer/file?file=//fileServer/report.doc&dest=//newServer/filesAccessedByWID/report.doc>

FIG. 5F

?cookie=acct\_nbr:123456

FIG. 5G

<http://DataManipulationServer/email>

FIG. 5H

<http://DataManipulationServer/email?msg=//mailServer/msg98765.txt&dest=lucy@ricardo.com>

FIG. 5I

<http://DataManipulationServer/view?file=//fileServer/report.doc&template=segment>

FIG. 6A

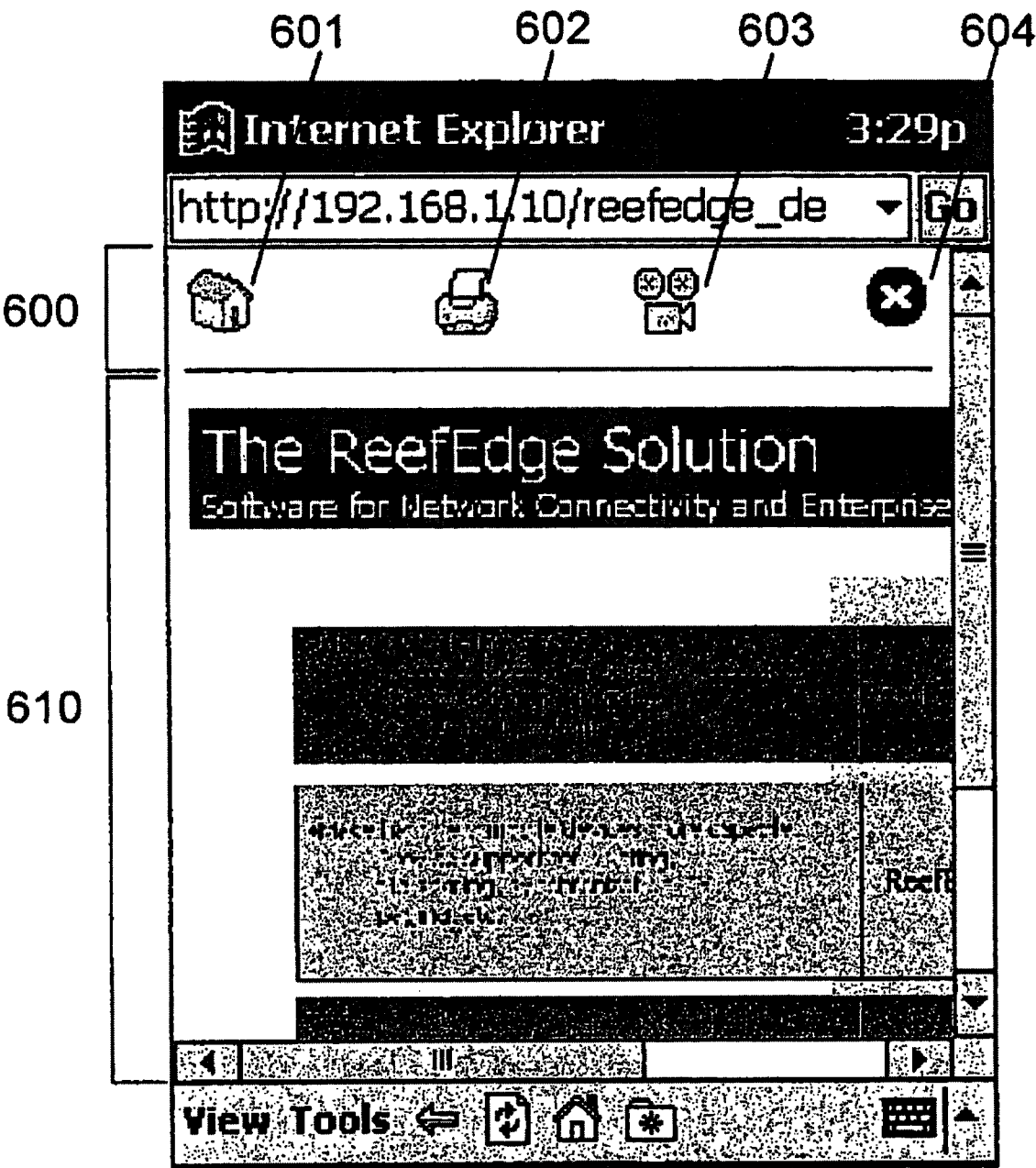
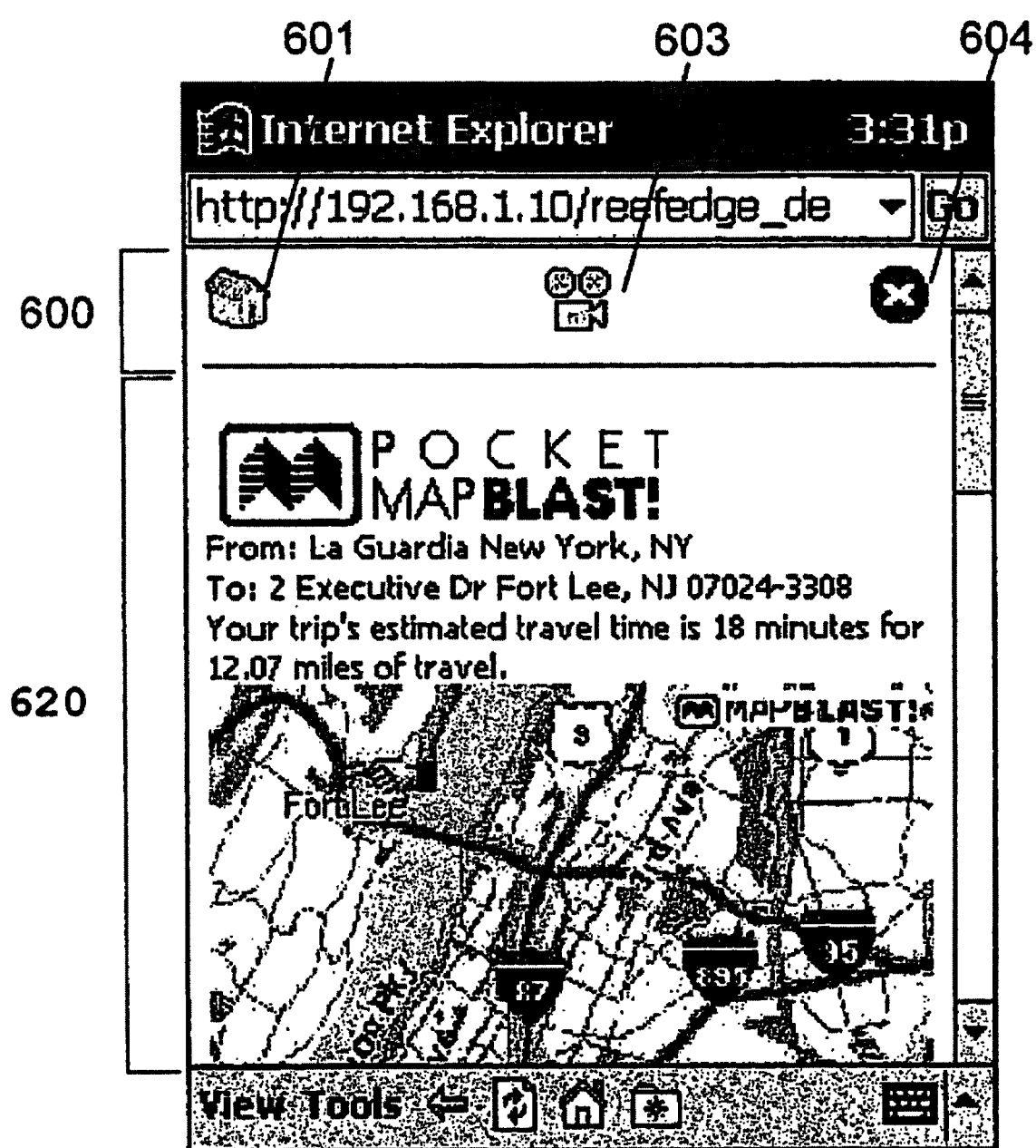


FIG. 6B



# TECHNIQUE FOR ENABLING REMOTE DATA ACCESS AND MANIPULATION FROM A PERVASIVE DEVICE

## CROSS-REFERENCE TO RELATED APPLICATION

This application is a continuation of prior application Ser. No. 09/848,394, filed May 3, 2001, which is hereby incorporated herein by reference, now U.S. Pat. No. 6,925,481.

## FIELD OF THE INVENTION

The present invention relates to pervasive computing, and more particularly to methods, systems, and computer program instructions for enabling users of pervasive devices (such as limited-function mobile devices, smart appliances, etc.) to remotely access and manipulate information in ways that might otherwise be impossible or impractical because of inherent limitations of the device.

## BACKGROUND OF THE INVENTION

Pervasive devices (also referred to as "pervasive computing devices") have become popular in recent years as people increasingly seek "anywhere, anytime" access to services such as voice and data communications. Many pervasive devices are designed to be mobile, and may equivalently be referred to as "mobile devices" or "mobile computing devices". Examples of mobile pervasive devices range from two-way pagers to personal digital assistants, or "PDAs" (such as the Palm Pilot, Handspring Visor™, or Compaq iPAQ) to cellular phones (such as the Nokia 6110) to multi-function devices (such as the Nokia 9110 or Qualcomm "pdQ™" smartphone). ("Visor" is a trademark of Handspring, and "pdQ" is a trademark of QUALCOMM Incorporated.) All pervasive devices are not necessarily mobile, however. Examples of this latter category include smart appliances for the home or business setting, devices which are permanently mounted in automobiles, and so forth.

Pervasive devices typically share several common characteristics:

- 1) limited processor speed;
- 2) limited memory capacity;
- 3) small size, which limits the richness of the data input and output interfaces (for example, small screen, limited keypad, and so forth);
- 4) a limited amount of software pre-installed on the device; and
- 5) access to limited-bandwidth networks.

The inherent drawbacks of these characteristics are further exacerbated by:

- 1) the need to maximize the device's relatively short battery life—which in turn prevents additional processor power or memory capacity from being added to the device; and
- 2) the need to simplify use of the device—which in turn reduces the desirability of supporting an "open" software installation platform in which arbitrary software packages might be added.

As people rely on pervasive devices for day-to-day information access tasks, they find that the experience can be extremely limiting. While pervasive devices vary widely in functionality and in their capabilities, some general observations for an average pervasive device can be made. First, the device typically does not have sufficient memory to store

all of the information that the user requires. Indeed, most of a user's files or data are normally stored on a desktop personal computer ("PC"), laptop, or corporate server. Moreover, the device's memory limitations often prevent the user from manipulating large files, such as graphics-intensive presentations (where it might be desirable, for example, to re-order the slides within a presentation). Second, the device typically does not have the software required to access all of the data that the user might wish to use. For example, most pervasive devices are unable to run common software applications such as Microsoft® Word or Microsoft® Powerpoint. ("Microsoft" is a registered trademark of Microsoft Corporation.) Some pervasive devices, such as two-way pagers from Research In Motion ("RIM"), do not usually have a Web browser installed, and therefore the user cannot render data formatted as Web documents. Third, the device often does not have the necessary drivers installed with which to support all the data manipulation operations the user might wish to perform. For example, pervasive devices typically do not have drivers to support operations such as printing and faxing. Similarly, pervasive devices typically do not have drivers for video graphics array ("VGA") adapters that would enable the device to display content to a projector (such as a liquid crystal display, or "LCD," projector).

Some pervasive devices would not be considered as limited in function, although they may suffer from some of the drawbacks of limited-function devices such as poor ease-of-use (having, for example, a small screen size). Examples include the Compaq iPAQ Home Internet Appliance IA-1 and the Audrey™ home appliance from 3Com Corporation. ("Audrey" is a trademark of 3Com Corporation.) The term "Wireless Information Device", or "WID", will be used hereinafter to refer to this type of pervasive device as well as limited-function pervasive devices. (This term recognizes the fact that both the limited-function and full-function pervasive computing devices typically communicate using wireless communication techniques and protocols, such as 802.11, Bluetooth, and so forth.)

Various attempts have been made to address the limitations of WIDs; however, existing approaches fail to provide a satisfactory solution.

One existing approach to addressing the limitations of WIDs involves the technique of "transcoding" content into a form that is better suited for the WID. Products such as the WebSphere® Transcoding Publisher from International Business Machines ("IBM") Corporation and Spyglass Prism from Open TV, Inc. represent examples of this class of solution. ("WebSphere" is a registered trademark of IBM.) Through transcoding, the content is programmatically manipulated for a target device. For example, the transcoding process may enable the content to be rendered effectively on a small-screen device (perhaps by altering font size, removing image files, and so forth). Typically, a "transcoding engine" located on a server or network device receives the content in its original form, performs a conversion process, and delivers the renderable format to the client device. However, these transcoding solutions only address the need to view content: they do not provide a capability to manipulate the content from the WID. For example, the transcoding process does not enable the WID to e-mail, fax, print, or project the content.

Another approach to addressing the limitations of WIDs involves supplementing the capabilities of the WID through the deployment of hardware adapters or software. For example, a special-purpose attachment (known as a "Springboard™" module) may be plugged into a Handspring Visor

device to enable the device to perform additional functions such as viewing and projecting Microsoft PowerPoint files. ("Springboard" is a trademark of Handspring.) The Presenter-to-Go™ module from Margi Systems, Inc. is one instance of such an attachment. ("Presenter-to-Go" is a trademark of Margi Systems, Inc.) As another example, software may be installed on a Microsoft Pocket PC device to enable the device to print Microsoft Word files to a limited set of printers. The PrintPocketCE software from FieldSoftware Products is one instance of such a software product. However, these client-centric add-on approaches increase the cost of the WID solution significantly and sometimes far exceed the cost of the WID itself. They also require additional power, effectively reducing the WID's available battery life. Each add-on solution typically supports only a single data manipulation option (or a very limited set of options), for only a limited set of file formats (or in some cases, for a single file format). Several different add-ons may therefore be needed to enable a WID to meet a particular user's requirements. An additional disadvantage of this approach is that the extra hardware is often bulky and inconvenient to carry, whereas additional software often requires a complex installation process by end-users, consumes valuable memory on the WID, and may not interoperate effectively with existing software loaded on the WID. Therefore, what is needed is a technique for enabling WIDs to access and manipulate data that avoids the limitations of the prior art.

#### SUMMARY OF THE INVENTION

The present invention is directed to methods, systems, and computer program instructions for enabling wireless information devices to access and manipulate data. The data being accessed may reside on a Web server, a file server, a personal desktop PC, or elsewhere. The data may represent virtually any type of information, including Web content, e-mail messages, or files in various formats. The data manipulation operations that are provided through use of the present invention may include viewing, faxing, printing, and projecting the data, as well as delivering the data to a voice messaging system.

Note that the discussion herein is primarily in terms of a limited set of data manipulation tasks or operations. These operations are discussed for purposes of illustration, and not of limitation. Many other manipulation operations might be provided in an implementation of the present invention, including modifying or changing data in some way; converting data from one format to another; transferring data from one device to another (e.g. to a remote file server for storage); publishing the data to a Web site; importing data (including a file or document) into a repository; disseminating data to one or more recipients (such as by sending e-mail messages); attaching data to a workflow message; controlling a remote application (such as launching and paging through a remotely hosted PowerPoint presentation); and so forth.

Enabling WIDs to easily access a wide variety of types of data and to initiate a wide variety of manipulations on that data in an efficient, cost-effective manner—in spite of the device's inherent limitations (such as limited processor capacity, limited embedded software, and/or limited bandwidth capability)—is a primary objective of the present invention.

In preferred embodiments, the techniques of the present invention provide these advantages without requiring the installation of new software or hardware on the WID, in a

manner that is easily extensible to support new manipulation operations and new data types.

Objectives of the present invention are realized by a solution that comprises one or more proxies, zero or more agents, and a data manipulation server (hereinafter, "DMS"). The DMS provides information about what services may be performed, and how to invoke those services. The DMS also performs operations on behalf of the WID, in cooperation with the proxies and the agents. In preferred embodiments, the proxies, agents, and DMS are not located within the WID, but instead are accessed by sending one or more request messages from the WID. This solution enables the WID's capabilities to be augmented in a very flexible yet powerful and cost-effective manner, without requiring any modifications to be made to the WID itself.

#### BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 provides a block diagram which depicts an architecture and components of a preferred embodiment of the present invention.

FIGS. 2A and 2B illustrate examples of a table in which information about available data access and/or manipulation services is stored, according to a preferred embodiment of the present invention.

FIG. 3 provides a flowchart that depicts logic with which a WID accesses data and receives information about what manipulation operations are available on that data, according to a preferred embodiment of the present invention.

FIG. 4 provides a flowchart that depicts logic with which a WID requests a manipulation service upon data it has accessed, and with which that service is performed, according to a preferred embodiment of the present invention.

FIGS. 5A-5I provide syntax examples that are used in describing operation of a preferred embodiment of the present invention.

FIGS. 6A and 6B illustrate samples of graphical user interface ("GUI") displays that may be used to display available service information, according to the present invention.

#### DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

The present invention will now be described more fully hereinafter with reference to the accompanying drawings, in which a preferred embodiment of the invention is shown. Like numbers refer to like elements throughout.

Flowchart illustrations of aspects of the present invention are described below. The logic of these flowcharts may be provided as methods, systems, and/or computer program instructions embodied on one or more computer readable media, according to an embodiment of the invention. As will be obvious to one of ordinary skill in the art, these flowcharts are merely illustrative of the manner in which the associated aspects of the present invention may be implemented, and changes may be made to the logic that is illustrated therein (for example, by altering the order of operations shown in some cases, by combining operations, etc.) without deviating from the inventive concepts disclosed herein.

The present invention provides an efficient, cost-effective technique for enabling a wireless interface device to easily access a wide variety of types of data and to initiate a wide variety of manipulations on that data, without requiring the installation of new software or hardware on the WID, and in a manner that is easily extensible to support new manipulation operations and new data types.

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FIG. 1 illustrates a preferred architecture and components of a system in which the present invention operates. The system may provide support for multiple WIDs, although only one WID 130 is illustrated in FIG. 1. The WID, which in preferred embodiments is a commercially-available WID which may be provided by any one of a number of vendors, includes at least one software application with which a user interacts to access and/or manipulate data. In preferred embodiments, this user-interaction software application is the only software required on the WID to enable use of the present invention. This user-interaction software preferably comprises a browser implementation (such as a Web browser); in alternative embodiments, other types of user-interaction software applications (including, but not limited to, e-mail client software) may be used. The user-interaction software application may be installed on the WID when it is marketed, and may be a commercially-available software implementation. When browser software is present, it preferably supports at least one markup language. Examples of markup languages that may be supported include the Hypertext Markup Language ("HTML"); Wireless Markup Language ("WML"); and Voice Extensible Markup Language ("VoiceXML").

Note that while preferred embodiments of the present invention operate with commercially-available WIDs and without requiring hardware or software modifications or add-ons, in alternative embodiments the WID may be specifically adapted for use with the present invention, without deviating from the inventive concepts disclosed herein. For example, a WID might include modifications to provide a user interface tailored for use with the present invention, or perhaps code for optimizing data access and/or manipulation processing. Moreover, auxiliary software may be provided to provide enhanced authentication, encryption, compression, or similar functions that augment the transmission of data described herein. Furthermore, while the preferred embodiment anticipates invocation by user interaction (and user-interaction software), there may be implementations in which automated or programmatic invocation is appropriate. In these cases, software which embodies the automated or programmatic invocation may replace the previously-described user-interaction software as the only software required on the WID to enable use of the present invention. Or, the two forms of invocation software may co-exist on a WID.

At least one protocol proxy 120 is provided, according to the teachings of the present invention. A protocol proxy provides a bridge between the client (i.e. an application executing on WID 130) and the information that it seeks to access and manipulate. A protocol proxy is responsible for accessing information on behalf of the client and (in preferred embodiments) annotating this accessed information with information about the manipulation services available for that accessed information. (The annotation process is described in more detail below, with reference to Block 350 of FIG. 3.) The information may be accessed, for example, from its location on one or more Web content servers in the World Wide Web (hereinafter, "Web") 110, in a distributed file system 150 of the prior art, or from an application of the prior art. This content server may deliver content that includes services which have been "pre-added" to the content (e.g. by querying the DMS directly), so that the protocol proxy is not required to provide additional annotations. This latter situation may be particularly beneficial, for example, if the content server happens to be co-located with the DMS.

Preferred embodiments of the present invention include at least one of the following types of protocol proxy: (1) a

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Hypertext Transfer Protocol ("HTTP") proxy, (2) a Wireless Session Transfer Protocol ("WSP") proxy, and (3) a Simple Mail Transfer Protocol ("SMTP"), Post Office Protocol ("POP" or "POP3"), or Internal Message Access Protocol ("IMAP") proxy. An HTTP proxy handles requests for and reception of information using HTTP request and response messages. A WSP proxy handles requests for and reception of information using WSP request and response messages. SMTP, POP, and IMAP proxies handle requests for and reception of electronic mail respectively using SMTP, POP, and IMAP request and response messages.

Alternative embodiments may include different and/or additional protocol proxy types. For example, a synchronization protocol proxy may be included, which may be used to synchronize data stored locally on a user's WID with data stored elsewhere (such as on the user's desktop PC). An example synchronization protocol is "SyncML" which is being developed by The SyncML Initiative to seamlessly synchronize wireless and wireline data and devices. (See <http://www.syncml.org> for more information on SyncML.)

The protocol proxies in a particular implementation of the present invention may each run on different hosts if desired, and individual protocol proxies may be co-located with other components of the system. The protocol proxy function described herein may be replicated, if desired (for example, to administratively separate different types of proxy function, for purposes of fault tolerance or fault isolation, for scalability and load balancing, etc.) Moreover, a single proxy may itself be divided into separate components. For example, an HTTP proxy may include a first component that determines whether the request is for content on the Web or perhaps on a file server; a second component that handles those requests which are for Web content; and a third component that handles those requests which are for content from a file server. The multiple components may, in turn, be distributed across multiple machines.

In one embodiment, prior art configuration mechanisms are used to adapt the WID for communicating with a protocol proxy. For example, the client Web browser may be instructed to communicate with an HTTP proxy, or synchronization software on the WID may be configured to send synchronization protocol messages to the synchronization protocol proxy. In this embodiment, the protocol proxy then intercepts outbound messages from the client on the WID and processes those messages as disclosed herein. In another embodiment, a WID communicates with a protocol proxy through a wireless access point (not shown in FIG. 1), such as an 802.11 access point or a Bluetooth access point (the functioning of which is known in the art). In this latter embodiment, the access point or an adapter device communicating with the access point receives outbound messages from the WID and evaluates those messages to determine which protocol is in use. The access point or adapter device then routes the outbound message to the appropriate protocol proxy. (This latter embodiment is preferred in the present invention because it avoids the need to configure the WID.)

Zero or more file access proxies 140 are also provided, according to the present invention. File access proxies may be located on various file servers, desktop computers, database systems, or other storage devices, and provide access to data stored in one or more repositories 150 which are located on (or otherwise accessible to) those machines. A particular file access proxy may access data from a local repository, within remote data stores (such as information that is accessible from a remote file server or Web server), information stored within local applications (such as stored

e-mail messages), and/or information stored within remote applications (such as information that is accessible through a database or directory application). Accessible information may be dynamically generated by the local or remote application, such as a live sensor reading.

A data manipulation server 160 is provided, according to the present invention. In preferred embodiments, the DMS has two roles. One role is to provide data manipulation services. Another role is to maintain a repository of the available services for various types of data and to make this information available.

While not shown in FIG. 1, it may be desirable in some situations to have multiple data manipulation servers 160, for example for purposes of availability or load balancing or administrative control. Furthermore, the DMS may be located within a cluster. The function of the DMS may optionally be partitioned, with different services hosted on different DMS's.

In its role of providing data manipulation services, those services may be provided by the DMS either directly, or indirectly by invoking one or more data output agents 170 (which are described below). For example, the DMS may directly manipulate content by performing a conversion of the content into HTML upon receiving a conversion request from the WID. As another example, the DMS may indirectly manipulate content by forwarding the content to a file manipulation agent, where that file manipulation agent is responsible for storing the content in a repository. In simple cases, the DMS may operate in a "pass-through" mode wherein it merely forwards content to a data output agent (such as a file manipulation agent). In most cases, however, the DMS performs operation-specific processing of the data received from the client before determining whether and where to forward data that may need further processing by an agent. In general, the data manipulation operations provided by the DMS may be arbitrarily complex, and operate in a content-dependent manner. In some cases, manipulation requests received from the WID may imply other manipulations that need to be performed. As one example, if a request is received from the WID to fax content to a recipient, the DMS preferably invokes a conversion process (which may be provided by the DMS, by a data output agent, or perhaps by another component of the system) to transform the content into Tag Image File Format ("TIFF"), where the resulting TIFF document is then sent to a data output agent responsible for performing facsimile transmission. As another example, if a request for printing a Web page is received from the WID, the DMS first accesses the content of the Web page by retrieving it from the Web (or perhaps from cache storage) and then forwards that content to a selected data output agent which is responsible for print services. More information on the data manipulation processing provided by the DMS is provided below, with reference to FIG. 4.

In its role as a repository of available services, the DMS preferably maintains a table (or a list or other analogous structure, referred to hereinafter as a "table" for ease of reference) to identify those services. At run-time, this table is used to provide the WID with a list of the available data manipulation services for particular data content. The table is preferably organized according to file content type. An example is shown in FIG. 2A, which indicates that files of type "XML" may be converted to WBXML ("Wireless Application Protocol Binary XML") decks (see 205) or faxed to recipients (see 210), whereas files of type "ASCII" may be sent as e-mail (see 215). In this example, the file content type appears first, in column 200; an identification of

the service appears next, in column 201; and an address of the service (i.e. a service invocation address, described below) appears in column 202. The service identification from column 201 may, for example, be presented to a user on a user interface to enable user selection of the corresponding service.

Alternatively, the table may be organized in a different manner. Furthermore, the entries in the table may optionally provide for further qualifying the services, such that the availability of a particular service depends on additional factors beyond the file content type. Examples of such factors include: (1) identification of individual users or user groups; (2) user privileges or access rights; (3) particular locations from which a service will be available; (4) the target WID type; and (5) combinations of such factors. FIG. 2B provides an example of this optional further qualification, wherein the example table is organized according to file content type (in column 250), user identification (in column 251), and location (in column 252). The service is identified in column 253, and the service invocation address appears in column 254. As illustrated therein, the print service is available with all files and all locations (indicated by presence of a wildcard symbol "\*" for user A (see 255), whereas printing is only available to user B for files of type ".doc" and only while he is located in Conference Room C (see 260).

When user identifying information is stored in the DMS' table for use as a factor in service availability, it may be represented in several alternative formats, such as: the user's name; a department number to which an authorized user must belong; an Internet Protocol ("IP") address (which may optionally identify a user group, e.g. through a subnet mask) of the user's WID; and so forth. Similarly, location information used as a factor in service availability may be represented in several alternative manners. Location information is further described below, with reference to Block 340 of FIG. 3. Some factors used in determining service availability, such as user access rights or privileges, may require dynamically querying a directory or similar repository at run-time to determine availability. Information used in the retrieval may in some cases be obtained from the request message issued by the client (e.g. from header values in HTTP requests). Techniques for performing this type of dynamic look-up processing are well known in the art, and will not be described in detail herein.

The examples in FIGS. 2A and 2B use a simplified format for purposes of illustration. In an actual implementation, the entries in the tables may vary from the format shown. For example, the identification of the available service may perhaps be represented using numeric identifiers, rather than textual descriptions. In this case, the WID may optionally contain software adapted for use with the numeric codes, and may translate the codes into text before displaying a list of available services to the user. Or, this translation might be performed by the protocol proxy before the available services list is returned to the WID. The table might also contain an identification of an icon or graphic symbol corresponding to selected ones of the available services, where this icon or symbol can be displayed to the user on the WID. The table might also contain multiple versions of the textual or graphical descriptions, to accommodate presentation in different languages.

A "service invocation address" is specified for each service (see the examples in columns 202 and 254 of FIGS. 2A and 2B, respectively) and indicates an address at which the service may be invoked. In preferred embodiments, these addresses are provided as Uniform Resource Locators



("URLs"). Preferably, the addresses are specified within the entries stored in the DMS's table, as shown in the example tables of FIG. 2A and FIG. 2B, although alternatively the addresses may be separately stored (perhaps as a storage optimization). As an example of using the latter approach, a print service might appear many times in the DMS' table. To eliminate redundant storage of this service's URL, the URL might be correlated to the print service but separately stored, enabling individual table entries such as 255 and 260 in FIG. 2B (which specify qualifiers on when printing is available) to be associated with the proper URL at run-time even though column 254 is omitted. Similarly, separate storage may be desirable in cases where the appropriate URL to use for creating the available services list is determined dynamically at run-time.

Note that while the service invocation addresses used herein as examples specify locations on a DMS, this is for purposes of illustration and not of limitation. One or more of the URLs may alternatively identify services provided at locations other than the DMS.

In alternative embodiments, service invocation addresses may employ address formats other than URLs, such as e-mail addresses, or perhaps a combination of an e-mail address and subject line, to designate a service to be invoked.

When requested information is delivered to a client application on the WID, a list of service invocation addresses for the available services is provided along with that information (as will be discussed in more detail with reference to Block 350 of FIG. 3). Each service invocation address is preferably augmented with an identity of the information that is to be operated upon. In some cases, it may be possible to infer the information identity from the service invocation address, in which case this augmentation is not required. For example, a service invocation address might identify a Structured Query Language ("SQL") query whose result is implicitly the data being manipulated.

Returning now to FIG. 1, one or more data output agents 170, which implement specific output manipulation operations (such as printing, faxing, projecting, or delivering to a voice mail system, the details of which do not form part of the present invention), are provided. (Note that a data output agent, as the term is used herein, refers to a component that delivers file content to an output device, whereas a file access proxy as defined herein retrieves file content in read-only mode. In some instances, a data output agent and a file access proxy may be co-located, and furthermore these functions may be implemented within a single software component.) The DMS passes data to selected ones of these agents to perform the manipulation services which are managed by the DMS. In preferred embodiments of the present invention, one or more of the following data output agents are supported:

- a print server agent, which is responsible for sending jobs to one or more printers;

- a projection server agent, which is responsible for driving the display of content to an LCD projector, video display, or other graphical terminal;

- a file manipulation server agent, which is capable of performing file operations such as copying, deleting, and renaming files (and which is typically co-located with a file access proxy);

- an e-mail manipulation server agent, which is capable of performing e-mail operations such as sending, receiving, and deleting e-mail messages (and which is typically co-located with a file access proxy that accesses e-mail files);

- a fax server agent, which is responsible for sending information for facsimile transmission; and

- a voice mail server agent, which is responsible for sending information for delivery through a voice messaging system.

The agents may send data to queues or other similar structures or processors, which may in turn be implemented as agents. For example, the output of a print server agent may be sent to a selected print queue for printing (using queuing techniques which are well known in the art). An agent such as a print server may manage local resources, such as a locally-stored print queue for a particular printer, or remote resources, such as access to multiple printers (each of which typically has its own print queue processing). In degenerate cases, a print server agent may be manifested simply as a print queue. Similarly, other agents such as the fax server agent and projection server agent may be manifested as queues for their respective devices.

Referring now to FIG. 3, logic is illustrated that may be used to provide data access support for a WID, including delivery of a list of the manipulation operations that are available on that data. At Block 300, the client software on the WID issues a request for information. (This corresponds to request message flow 1 in FIG. 1. The encircled numbers in FIG. 1 all refer to message flows.) Typically, this request is initiated by action of the WID user. Block 310 indicates that a protocol proxy receives this request. As described earlier, the outbound request either may be received by the protocol proxy to which the client software has been configured to communicate, or may be received by a wireless access point or adapter device (which then inspects the content to determine which protocol proxy is required, and forwards the request to that proxy).

At Block 320, the protocol proxy forwards the request to the appropriate information source. For example, if the request is an HTTP request for Web content issued by a Web browser, then an HTTP proxy forwards that HTTP request to the Web. Or, if the request is for file content, it will be forwarded to a file access proxy. (This corresponds to message flow 2 or 3 in FIG. 1.) At Block 330, the protocol proxy receives the response from the information source. (This corresponds to message flow 4 or 5 in FIG. 1.)

The protocol proxy then determines, in Block 340, which services are available to the WID for manipulating the returned content. This determination may be made in several ways. In a preferred embodiment, the protocol proxy issues a query to the DMS for a list of available services. (This corresponds to message flow 6 in FIG. 1.) Upon receiving the list from the DMS, the protocol proxy may optionally cache the list for use with subsequent requests (in order to avoid the message exchange and processing overhead of repeatedly requesting such information from the DMS). In an alternative embodiment, the protocol proxy may be statically pre-configured with a list of available services that are appropriate for particular types of content, users, locations, or other criteria as described previously with respect to FIGS. 2A and 2B; in this case, message flow 6 of FIG. 1 is not required.

When queried by the protocol proxy at Block 340, the DMS consults its stored table entries (see FIGS. 2A and 2B for examples), using logic that is adapted to the particular storage format in use by that DMS, and determines which services are available for the data being returned to the WID. As stated earlier, the available services are preferably filtered according to the type of content being returned, and may also (or alternatively) account for one or more other factors. (This filtering process has been discussed with reference to FIGS. 2A and 2B, above.)

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When an identification of the user is one of the factors used to determine service availability, the user's identification may be obtained in a protocol-specific manner. For example, the user's identification may be available as the value of a cookie in an HTTP request or response header. Or, in some cases a look-up operation may be performed to obtain this information if a table or other similar repository of such information is available.

In preferred embodiments, the client software on the WID does not participate in data manipulation operations (rather, the request is sent to the DMS, which obtains the data and manages the manipulation operations), and therefore capabilities of the WID may not be of interest when determining the list of available services. However, there may be some cases where this information is deemed useful. For example, it may be known that user input is required for a particular manipulation operation (such as specifying the target of an e-mail message). If the target WID is incapable of supporting the necessary interactions, then that service is preferably omitted from the delivered list by the evaluation performed by the DMS at Block 340. When this type of processing is to be performed, information about the capabilities available on the WID may be obtained in a variety of ways, such as by inspecting the content types accepted according to the Accept header of an HTTP message, by assessing browser capabilities according to information provided in the User-Agent header of an HTTP message, by analyzing capability information explicitly provided by the device, or by inspecting a repository of capability information indexed by device identity. These approaches for determining client capabilities are well known in the prior art.

When information about the location of the WID is used as a factor in determining available services, this location information may also be obtained in various ways and once obtained, may be used in various ways. The location information may, for example, be determined by querying a global positioning system ("GPS") function on the client. Or, the location information might be obtained by querying a Location Registry, such as the Location Registry described in commonly-assigned U.S. Pat. No., still pending (Ser. No. 09/848,441, filed concurrently herewith), which is entitled "Location-Aware Service Proxies in a Short-Range Wireless Environment" and which is incorporated herein by reference. As disclosed therein, a mobile device's access point (equivalently, a WID's access point) monitors its traffic to obtain the device's location. This location information, which preferably comprises a list of access points which are near the mobile device at a point in time, is maintained in the Location Registry. This Location Registry implements a query interface that may be used by an implementation of the present invention to determine the location of a particular WID. This related invention also discloses "Location Aware Service Proxies" that intercept requests initiated by mobile clients, and that use the location of the mobile device to determine which content to deliver to the mobile device. These location-aware service proxies may be used in conjunction with the present invention to determine what content may be delivered, and a protocol proxy may then annotate that content with available services information (where the set of available services may also be based on location, among other factors). Furthermore, a protocol proxy as disclosed herein may also function as a location-aware service proxy. In this latter case, the location-aware service proxy preferably performs further location-sensitive filtering on the available services list obtained from the DMS in Block 340. Or, alternatively, the location-aware service proxy may transmit location information to the DMS

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(e.g. on message flow 6 of FIG. 1), where the DMS then factors that information into its list-generation processing.

Once the protocol proxy has the list of available services, it preferably formats or annotates that list in Block 350. (In alternative embodiments, this function may be performed by the DMS before it returns the available services information to the protocol proxy.) In a preferred embodiment, this annotation comprises modifying the service invocation addresses to enable the WID's user to easily invoke each available service. For example, in the case of HTML content such as a Web page, the protocol proxy in this preferred embodiment adds a set of links (which may be represented as text or icons) to the list of available services that may be used to manipulate that HTML content. Preferably, the links take the form of a service invocation address that is parameterized with an identity of the information to be manipulated. Suppose, for example, that one of the available services is to print a Web page, and that the DMS has supplied the service invocation address shown in FIG. 5A for that print operation, where this syntax, in this example, identifies print service software on the DMS itself. Using the standard HTTP syntax for a parameter list, the Web page "www.reefedge.com" may be identified for printing by this print software by supplying the parameter list shown in FIG. 5B, which identifies the data being manipulated, thereby yielding an annotated link as shown in FIG. 5C.

As another example, suppose a Microsoft Word document named "report.doc", which is accessed from the root directory of a file server named "fileServer", is being returned to the WID, and that available services for this document include printing it and filing (i.e. storing) it on a file server. To print the document, the document may be identified for printing by the print software on the DMS by supplying the sample syntax shown in FIG. 5D, where the parameter "file=fileServer/report.doc" identifies the data being manipulated.

Alternatively, to identify the document for filing at a location "newServer/filesAccessedByWID/", the sample syntax shown in FIG. 5E may be used, where the value of the "dest" parameter identifies the new file storage location.

In the preferred embodiment, the service invocation address may be coupled with additional information during this annotation process in order to ensure that the DMS (and/or data output agent, as appropriate for a particular manipulation service) accesses and manipulates the required information. For purposes of illustration, suppose the user accessed a Web page for which cookie values were used in customizing the page content. As an example, the WID user's bank account number may have been transmitted in a cookie on the outbound HTTP request message, and this account number may have been used by a Web server to generate a Web page showing the user's current bank account balances. If, after viewing this customized Web page, the user decides that she would like to print the information, the DMS must be able to use this same page content when invoking the printing operation. Rather than forwarding the Web page from the WID to the DMS, the protocol proxy of the preferred embodiment captures the cookies that were present on the original HTTP request and includes those cookies as additional parameters on the annotated links created during the processing of Block 350. (Preferably, all cookies are stored and copied to the links, although if the protocol proxy is adapted to know that certain cookies are irrelevant, they may be omitted.) By preserving the cookies in the link annotations, the subsequent manipulation services invoked from the DMS will automatically have the same cookie values that were used in processing the

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original request message, thereby ensuring that the manipulated content corresponds to the content delivered to the WID user. FIG. 5F provides an example of syntax that may be used to annotate a link with a cookie whose name is "acct\_nbr" and whose value is "123456". (Note that the DMS prepares the user's bank account information for printing in response to a data manipulation request indicated as message flow 8 in FIG. 1, and invokes the print process at a data output agent by issuing message flow 10 in FIG. 1. The processing performed by the DMS may further comprise obtaining bank account information by issuing message flow 9 in FIG. 1.)

This same approach may be used for form parameters that are submitted to a Web server (e.g. using an HTTP POST message). To encode the form parameter information in the URL, a parameter name such as "postParams" may be substituted for the "cookie" parameter name shown in FIG. 5F. A parameter name/value pair may then be listed, in an analogous manner to listing a cookie name/value pair.

A service invocation address may be coupled with any combination of cookies, form parameters, or other information.

When encoding cookies, form parameters, and other information in this manner, three issues should be considered. First, URL length is currently limited to 255 characters, according to the HTTP specification. Second, it is difficult to encode all character sets in URLs. Third, a DMS may in some cases be implemented within a Web client which is not able to programmatically control the sending of request data. For example, the DMS might use Microsoft Internet Explorer, which provides no programmatic way to force a cookie to be sent. To address these problems, the cookies, form parameters, and so forth may be cached by the protocol proxy (i.e. when the original content is being processed). This cached information may then be used in three ways to construct a valid request for use with the present invention.

In a first approach, in the service invocation address URL, a parameter can be given by which the cached parameters can be obtained by the DMS from the protocol proxy. For example, "?params=http://protocolproxy/params/139x3e245" gives the DMS a URL from which the cached parameters, cookies, etc. can be obtained. The value "139x3e245" in this example is meant as a temporary code which represents the parameters associated with the particular request.

In a variation of this first approach, the parameter on the service invocation address URL may identify how to obtain the cached parameters from the cache, rather than from the protocol proxy.

In a second approach, the data URL may actually point to the protocol proxy itself. The protocol proxy, upon receiving the data request from the DMS, determines the real request and obtains the requested data on the DMS' behalf. For example, "http://protocolproxy/request/139x3e245" might cause a request (along with the appropriate cookies, form parameters, and other information) to be issued from the protocol proxy to the true source of the data.

In a third approach, the DMS may request the content by itself using the protocol proxy, in much the same way that all requests from the WID were directed through the protocol proxy. However, the protocol proxy may annotate the data source with a tag that the protocol proxy can later use to reconstruct the original query. For example, the protocol proxy might rewrite the content request URL to be "http://www.yahoo.com/?protocolproxy=139x3e245", so, upon receiving the request from the DMS, the protocol proxy may

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look up session 139x3e245 in its cache, obtain the necessary parameters, and forward the properly-formatted request to location "www.yahoo.com".

It is also possible that the protocol proxy might cache the data content (rather than the parameters). In this case, the content location provided by the protocol proxy might then point to that cache. There is then no need to provide cookies or parameters in the URL, because the DMS can obtain the full content from the cache. To achieve maximal performance and capacity in this situation, the cache is preferably capable of storing multiple versions of content associated with the same URL, with each version associated with a different combination of cookies, form parameters, and other request information.

Optionally, additional formatting information may be supplied as parameters on selected service invocation addresses during the annotation process of Block 350. These additional parameters may be provided for implementation-specific usage, including for customization of the data manipulation service. One example, described above, is to specify a destination address for a file that is being stored in a repository. As another example, suppose the data manipulation service is to send an e-mail message to a particular recipient. An example of invoking the "email" service, which is managed through the DMS at the location shown in FIG. 5G, to send a message identified as "msg98765.txt" to the recipient "lucy@ricardo.com" is shown in FIG. 5H.

As yet another example of adding parameters to service invocation addresses, it may be desirable in a file conversion service to supply parameter values to be used in guiding the conversion process. Suppose, for example, that the previously-discussed "report.doc" Microsoft Word document is being converted to HTML, and that the conversion software allows several different types of transformations, based upon identification of a particular template. The template may specify how to format the title, for example, and how to "chunk" the source document into different pieces, how links to those pieces are embedded, and so forth. If the template parameter value is "plain", for example, the conversion is adapted to returning plain text, whereas if the template parameter value is "segmented", then the conversion may generate a "chunked" document where each logical input segment appears on a different page, and perhaps failing to specify a template parameter value causes the entire document to be generated as a single HTML page. A sample service invocation address for viewing the converted file in segmented form is shown in FIG. 5I.

Preferably, the annotation process of Block 350 generates separate annotated links for each valid option, such that when the user selects one of the links, all the necessary information is present for properly invoking the data manipulation service. (Note that the DMS prepares this file for viewing in response to a data manipulation request indicated as message flow 8 in FIG. 1, and returns the result for rendering on the WID at message flow 12 in FIG. 1. The processing performed by the DMS may further comprise obtaining the file content by issuing message flow 11 in FIG. 1.)

The parameter types supplied during the annotation process may be stored in, and obtained from, the DMS table along with the applicable service invocation address. Or, the protocol proxy may provide service-specific code for determining which parameter types are applicable for a particular service.

While the preferred embodiment has been described in terms of embedding the service description directly into the content (e.g. as links in HTML), other alternative

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approaches may be used without deviating from the scope of the present invention. As one example, the annotation process may comprise generating a compound document which combines the original content (in HTML, WML, XML, etc.) and the service definition (in XML, or perhaps a similar well-structured markup language). In this approach, the service description may be embedded directly into the content. As another example, a multi-part MIME (Multi-purpose Internet Mail Extensions) message may be generated which contains the original content (in one part) and the service description (in another part). These alternative approaches provide different ways for conveying the list of available services.

Optionally, an implementation of the present invention may enable the protocol proxy itself to directly invoke data manipulation operations. For example, during the annotation processing in Block 350, the protocol proxy may wish to save the content being returned to the WID in response to its request message into a cache, for faster retrieval on subsequent requests. Or, the protocol proxy may determine that a data conversion operation is desirable, for example by converting an XML document to a WBXML deck. Preferably, the protocol proxy sends a data manipulation request message to the DMS for such processing, and the DMS then invokes the necessary file access proxy and/or other data output agent processing. Upon receiving the response from the DMS, the protocol proxy preferably delivers the resulting data to the WID in addition to (or, alternatively, instead of) the originally accessed information. For example, if the original request was for a Web page, and the protocol proxy requests that this Web page be converted to a WBXML deck, then either the deck or the deck plus the Web page may be delivered to the WID, as appropriate in a particular implementation of the present invention. (As will be obvious, some types of DMS response are preferably never transmitted to the client, such as those responses or portions thereof which provide return code and status information.) This type of protocol proxy-initiated manipulation may be appropriate when software executing on the proxy can predict that the user would be likely to request the data manipulation operation, and the "automatic" invocation by the protocol proxy therefore serves to simplify the user's task. It is also appropriate when the protocol proxy can determine that the data in the accessed format cannot be presented on the WID without first performing a conversion. This latter type of determination may be made by inspecting the content types accepted by the WID, for example as indicated on the Accept header of the outbound HTTP request. In the preferred embodiment, the protocol proxy invokes a conversion service to convert all incoming Microsoft Word files to HTML or WML, because Microsoft Word files cannot be rendered natively on most WIDs. Other similar conversions may also be automatically provided. The list of available services to be delivered to the WID along with the content may be provided in terms of the originally-accessed content, or the manipulated content, or both, as appropriate in a particular situation.

Continuing on with FIG. 3, at Block 360, the content, along with the annotated list of available services, is returned to the WID. This corresponds to message flow 7 in FIG. 1. The WID then receives this information (Block 370) and preferably displays the content and/or the available services list to the user. However, in alternative embodiments, the service list might be displayed separately from the document. A browser might import that service list and populate a dynamic menu, pop-up, service selection panel, or other custom user interface component. (As stated earlier,

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in some cases it may be desirable to include custom or modified client software on the WID for use with the present invention, such as software which provides a tailored user interface.)

Once the service list is available, the user may then invoke a selected service in order to initiate further manipulation of the delivered content. In response to the user's invocation, a request message will be sent to the location identified on the service invocation address (which, as illustrated herein, is preferably an address identifying a service on the DMS, but alternatively may be a service running elsewhere). This request message corresponds to message flow 8 in FIG. 1. The processing performed on the DMS in response to receiving the data manipulation request will be described with reference to the logic in FIG. 4.

In some cases, a WID may have pertinent data that is locally stored, such as information to be used when sending fax content to a recipient. After receiving a list of available services from the protocol proxy and selecting one of these services, the locally-stored data may be posted from the WID to the DMS, for use as the selected service executes.

Note that programmatic operations on the WID may invoke a data manipulation service in some cases, rather than the user performing the invocation. For example, the DMS may embed a script within the available services list, where this script may autonomously invoke a manipulation service. Suppose, for purposes of illustration, that a WID issues a request to receive a current view of the user's calendar from his desktop PC. The data returned to the WID in response to the request may include one or more software-activated alarms. When the appropriate action occurs (such as the passage of time to reach a calendared alarm event), a data manipulation service identified in a script supplied by the DMS may be programmatically triggered to perform some alarm processing (such as printing the agenda for a scheduled meeting to the printer at the designated conference room).

Turning now to FIG. 4, logic is depicted that may be used to support processing when the WID requests a data manipulation service from the DMS. At Block 400, the WID issues a request for a particular service by invoking the provided (and possibly annotated) service invocation address. (This corresponds to message flow 8 in FIG. 1.) Note that all parameters for this invocation are already available (or indirectly indicated) on the service invocation address, having been supplied by the protocol proxy during the annotation process in Block 350 of FIG. 3. At Block 410, the DMS receives the request, and at Block 420, the DMS parses the annotated information in the request to determine the specified service invocation address, the identity of the data to be manipulated, and any other parameters that may be present. At Block 430, the DMS retrieves the identified data and may optionally manipulate it, according to the requirements of the particular data manipulation service being performed. For example, the DMS may know that a conversion service is necessary before performing the manipulation operation requested by the user, and may therefore automatically invoke such processing. As described earlier, if the user requests a fax service, then the DMS may retrieve the data and convert it into a TIFF file prior to transmitting it to a fax agent, without requiring the user to explicitly request the conversion to TIFF. (The transmission to the fax agent occurs according to Block 450, described below.) The DMS may perform this processing directly, or by invoking a data output agent or other conversion software.

Preferably, the annotated service invocation address provides a complete description of the data to be manipulated,

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as has been shown in the examples herein. Alternatively, it may happen that the DMS needs to evaluate additional information in order to locate the data. For example, if a file name is received that does not specify a complete file path from a root directory, then the DMS preferably uses imple-

mentation-dependent techniques for resolving the location and directory path information. (Or, an error message may be returned in such cases, if desired.)

At decision Block 440, the DMS determines whether processing by a data output agent is required to complete the requested service. Each service implemented on the DMS is adapted to knowing what type of further processing is required and what agent(s) need to be invoked.

If the answer to the decision block is Yes, then control passes to Block 450 where a request to the appropriate data output agent is generated. The data output agent that is invoked is preferably determined according to the type of service to be performed, and optionally by evaluating other factors (such as the user's identity, the processing load on particular printers, current network conditions such as available bandwidth and/or outages, which data output agent supports the user's e-mail service or file system, and so forth). The data output agent performs any necessary operations, using processing which is known in the prior art, to perform the requested data manipulation. For example, if the data output agent controls an LCD projector, then the data output agent retrieves the information to be projected, renders it, and makes the rendered information available to the associated projector (e.g. through a VGA output connector). Or, if the data output agent handles sending of e-mail messages, then the message to be sent is retrieved, formatted for delivery (if necessary), and transmitted.

In alternative embodiments, the DMS may choose to not retrieve selected data content until the data is required by the data output agent. This may be implemented by generating a special URL and passing this URL to the data output agent. When the data output agent needs the content, it requests that URL (from the DMS), and then the content is actually obtained (by the DMS, possibly through the protocol proxy) and delivered to the data output agent. This has the advantage of avoiding data retrieval until/unless it is needed, and avoids the need to "push" data to the data output agent.

As indicated at Block 460, the DMS then preferably receives a response message from the invoked data output agent. This response message may be simply a success or failure indication, or it may include additional information such as status information. For example, when a print service has been invoked, the response message may indicate that the print job has started (or is queued), which printer has the print job, where that printer is located, and so forth.

When the answer to decision Block 440 is No, and also following the processing of Block 460, at Block 470 the DMS generates a response to the WID that requested the data manipulation service. Similar to the response message received at Block 460, this response message may indicate success or failure, and may include additional information about the status of the request. Optionally, the response may include a list of further data manipulation services that may be performed on the data that was sent to the WID at Block 370 of FIG. 3. In some cases, the DMS may return new content to the WID after invocation of the data manipulation service. In these cases, the response message sent in Block 470 preferably includes a newly-created list of services that are available for this new content. This processing may be performed by the DMS initiating a request to the protocol proxy for content at a URL that is actually served from the

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DMS, after which the protocol proxy will retrieve the content from the DMS and then query the DMS for the services list. The protocol proxy then annotates this list, and returns the content to the WID. This approach avoids duplication of the service annotation processing logic.

Turning now to FIG. 6A, a sample GUI display that provides available service information is illustrated, according to the present invention. This display shows an image of a Microsoft PowerPoint presentation file that has been retrieved by a file access proxy. The file has also been converted for display on the WID (e.g. to make the slides of the presentation viewable on the WID's display panel). This conversion may be performed automatically by the protocol proxy upon detecting that the requested content is a PowerPoint file and/or that the target WID cannot display files of this type, as discussed earlier. Along with the content 610 of the slide, four icons 601-604 have been provided in a header area 600 to enable the user to select from among four data manipulation services which are available for this content. The first icon 601 provides a link to a home page; icon 602 may be selected to print the content; icon 603 may be selected to project the content; and icon 604 may be selected to log out of the system.

FIG. 6B provides another sample GUI display with available service information. This display shows an image 620 of a page retrieved from a Web server. Along with this content 620, three icons 601, 602, and 604 have been provided in header area 600. These icons represent the same functions discussed with reference to FIG. 6A. In this example, the printer icon 603 has been omitted, and the user therefore cannot request printing of the image. (It may be that there is no printer available for the WID's current location, or that the user is not authorized to access the printer, etc.)

As has been demonstrated, the present invention provides a number of advantages over prior art solutions for accessing and manipulating data content from a WID. The teachings which have been described do not require modifications of the WID, yet support a wide variety of data manipulation operations and a wide variety of content types. Furthermore, the supported operations and content types are easily extensible, again without requiring modifications to the WID.

The foregoing description of a preferred embodiment is for purposes of illustrating the present invention, and is not to be construed as limiting thereof. Although a preferred embodiment has been described, it will be obvious to those of skill in the art that many modifications to this preferred embodiment are possible without materially deviating from the novel teachings and advantages of this invention as disclosed herein. Accordingly, all such modifications are intended to be within the scope of the present invention, which is limited only by the claims hereafter presented (and their equivalents).

We claim:

1. A method of enabling data access and manipulation from a pervasive device, comprising the steps of: receiving a data access request from a pervasive device; obtaining the requested data; determining what data manipulation operations are available for the obtained data; and providing references to the determined data manipulation operations to the pervasive device.
2. The method of claim 1, wherein a reference to a determined data manipulation operation comprises a service invocation address.

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3. The method of claim 1, further comprising the steps of: receiving a request to perform a selected one of the determined data manipulation operations; and performing the requested operation on behalf of the pervasive device.
4. The method of claim 1, wherein the determining step further comprises determining what data manipulation operations are available for a content type of the obtained data.
5. The method of claim 1, wherein the determining step further comprises determining what data manipulation operations are available for a user of the pervasive device.
6. The method of claim 1, further comprising the steps of: determining a current location of the pervasive device; and determining what data manipulation operations are available for the current location of the pervasive device.
7. The method of claim 1, wherein the determining step further comprises determining what data manipulation operations are available responsive to a type of the pervasive device.
8. The method of claim 1, further comprising the steps of: performing one or more data manipulation operations on the obtained data, thereby creating transformed data; determining what data manipulation operations are available for the transformed data; and providing references to the determined data manipulation operations for the transformed data to the pervasive device.
9. A computer program product having a computer-readable medium having computer program code encoded thereon to be executed by a processor for enabling data access and manipulating from a pervasive device, the computer program code adapted to perform steps comprising: receiving a data access request from a pervasive device; obtaining the requested data; determining what data manipulation operations are available for the obtained data; and providing references to the determined data manipulation operations to the pervasive device.
10. The computer program product of claim 9, wherein a reference to a determined data manipulation operation comprises a service invocation address.
11. The computer program product of claim 9, further comprising the steps of: receiving a request to perform a selected one of the determined data manipulation operations; and performing the requested operation on behalf of the pervasive device.
12. The computer program product of claim 9, wherein the determining step further comprises determining what data manipulation operations are available for a content type of the obtained data.
13. The computer program product of claim 9, wherein the determining step further comprises determining what data manipulation operations are available for a user of the pervasive device.
14. The computer program product of claim 9, further comprising the steps of: determining a current location of the pervasive device; and determining what data manipulation operations are available for the current location of the pervasive device.

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15. The computer program product of claim 9, wherein the determining step further comprises determining what data manipulation operations are available responsive to a type of the pervasive device.
16. The computer program product of claim 9, further comprising the steps of: performing one or more data manipulation operations on the obtained data, thereby creating transformed data; determining what data manipulation operations are available for the transformed data; and providing references to the determined data manipulation operations for the transformed data to the pervasive device.
17. A system for enabling data access and manipulation from a pervasive device, comprising: a data manipulation server for maintaining a repository of data manipulation operations; and a protocol proxy in communication with the pervasive device and the data manipulation server and adapted to: receive a data access request from the pervasive device; obtain the requested data; communicate with the data manipulation server to determine, responsive to the obtained data, what data manipulation operations are available; and provide references to the determined data manipulation operations to the pervasive device.
18. The system of claim 17, wherein the data manipulation server maintains a service invocation address for a data manipulation operation in the repository and wherein the reference to the determined data manipulation operation comprises the service invocation address.
19. The system of claim 17, wherein the data manipulation server is adapted to receive a request to perform a selected one of the determined data manipulation operations and invoke the requested operation on behalf of the pervasive device.
20. The system of claim 17, wherein the protocol proxy is further adapted to determine what data manipulation operations are available for a content type of the obtained data.
21. The system of claim 17, wherein the protocol proxy is further adapted to determine what data manipulation operations are available for a user of the pervasive device.
22. The system of claim 17, wherein the protocol proxy is further adapted to: determine a current location of the pervasive device; and determine what data manipulation operations are available responsive to the current location of the pervasive device.
23. The system of claim 17, wherein the protocol proxy is further adapted to determine what data manipulation operations are available responsive to a type of pervasive device.
24. The system of claim 17, wherein the protocol proxy is further adapted to: perform one or more data manipulation operations on the obtained data, thereby creating transformed data; determine what data manipulation operations are available for the transformed data; and provide references to the determined data manipulation operations for the transformed data to the pervasive device.

\* \* \* \* \*



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Bib Data Sheet

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<b>APPLICANTS</b> Sandeep Kishan Singhal, Englewood Cliffs, NJ; Barry Eliot Levinson, New York, NY; Darren Michael Sanders, Nanuet, NY;						
<b>** CONTINUING DATA *****</b> This application is a CON of 09/848,394 05/03/2001 PAT 6,925,481, <i>yes MMM</i>						
<b>** FOREIGN APPLICATIONS *****</b> <i>none, MMM</i>						
<b>IF REQUIRED, FOREIGN FILING LICENSE GRANTED</b> <b>** 04/11/2005</b>						
Foreign Priority claimed 35 USC 119 (a-d) conditions met Verified and Acknowledged		<input type="checkbox"/> yes <input checked="" type="checkbox"/> no <input type="checkbox"/> yes <input checked="" type="checkbox"/> no <input type="checkbox"/> Met after Allowance Examiner's Signature <i>MMM</i> Initials	<b>STATE OR COUNTRY</b> NJ	<b>SHEETS DRAWING</b> 9	<b>TOTAL CLAIMS</b> 24	<b>INDEPENDENT CLAIMS</b> 3
<b>ADDRESS</b> 34415						
<b>TITLE</b> Technique for enabling remote data access and manipulation from a pervasive device						
<b>FILING FEE RECEIVED</b> 1200	FEES: Authority has been given in Paper No. _____ to charge/credit DEPOSIT ACCOUNT No. _____ for following:		<input type="checkbox"/> All Fees <input type="checkbox"/> 1.16 Fees ( Filing ) <input type="checkbox"/> 1.17 Fees ( Processing Ext. of time ) <input type="checkbox"/> 1.18 Fees ( Issue ) <input type="checkbox"/> Other _____ <input type="checkbox"/> Credit			

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FEE RECORD SHEET

03/11/2005 SMINASS1 00000054 11075437

01 FC:1011	300.00 OP
02 FC:1111	500.00 OP
03 FC:1311	200.00 OP
04 FC:1202	200.00 OP

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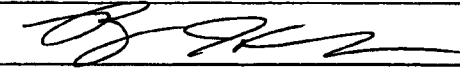
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NEW UTILITY PATENT APPLICATION TRANSMITTAL (only for new nonprovisional applications under 37 CFR 1.53(b))		Attorney Docket Number 20423-10036	
		First Named Inventor Sandeep K. Singhal	
		Title Technique for Enabling Remote Data Access and Manipulation From a Pervasive Device	
		Express Mail Label No. EV 342132685 US	
<b>APPLICATION ELEMENTS</b>		<b>ACCOMPANYING APPLICATION PARTS</b>	
1. <input checked="" type="checkbox"/> Fee Transmittal Form (in duplicate)		7. <input type="checkbox"/> Assignment Papers (cover sheet & document(s))	
2. <input type="checkbox"/> Applicant claims small entity status. See 37 CFR 1.27		8. <input type="checkbox"/> Certified Copy of Priority Document(s) (if foreign priority is claimed)	
3. <input checked="" type="checkbox"/> Specification <span style="float: right;">Total Pages <input type="text" value="43"/></span> (preferred arrangement set forth below)		9. <input checked="" type="checkbox"/> Power of Attorney or Authorization of Agent	
<input type="checkbox"/> Descriptive Title of the Invention		10. <input checked="" type="checkbox"/> 37 CFR 3.73(b) Statement	
<input type="checkbox"/> Cross Reference(s) to Related Case(s)		11. <input type="checkbox"/> Preliminary Amendment	
<input type="checkbox"/> Statement Regarding Fed sponsored R & D		12. <input type="checkbox"/> Information Disclosure Statement & PTO-1449 <input type="checkbox"/> Copies of IDS Citation(s)	
<input type="checkbox"/> Background of the Invention		13. <input type="checkbox"/> Nonpublication Request Under 35 U.S.C. 122 (b)(2)(B)(i). Applicant must attach form PTO/SB/35 or its equivalent	
<input type="checkbox"/> Brief Summary of the Invention		14. <input checked="" type="checkbox"/> Return Postcard	
<input type="checkbox"/> Brief Description of the Drawing(s)		15. <input type="checkbox"/>	
<input type="checkbox"/> Detailed Description		16. <input type="checkbox"/>	
<input type="checkbox"/> Claim or Claims		17. <input type="checkbox"/>	
<input type="checkbox"/> Abstract of the Disclosure			
4. <input checked="" type="checkbox"/> Drawing(s) (35 U.S.C. 113) <span style="float: right;">Total Sheets <input type="text" value="9"/></span>			
5. Combined Declaration and Power of Attorney			
a. <input type="checkbox"/> New Declaration <span style="float: right;">Total Pages <input type="text" value="4"/></span>			
<input checked="" type="checkbox"/> Executed (original or copy)			
b. <input checked="" type="checkbox"/> Copy from a prior application (37 CFR 1.63(d)) (for continuation/divisional with Box 18 completed)			
i. <input type="checkbox"/> DELETION OF INVENTOR(S) Signed statement attached deleting inventor(s) named in the prior application, see 37 CFR 1.63(d)(2) and 1.33(b).			
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Brian M. Hoffman		39,713	
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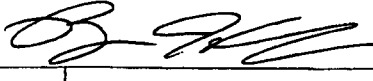
NEW UTILITY PATENT APPLICATION TRANSMITTAL <small>(only for new nonprovisional applications under 37 CFR 1.53(b))</small>		Attorney Docket Number 20423-10036	
		First Named Inventor Sandeep K. Singhal	
		Title Technique for Enabling Remote Data Access and Manipulation From a Pervasive Device	
		Express Mail Label No. EV 342132685 US	
<b>APPLICATION ELEMENTS</b>		<b>ACCOMPANYING APPLICATION PARTS</b>	
1. <input checked="" type="checkbox"/> Fee Transmittal Form (in duplicate)		7. <input type="checkbox"/> Assignment Papers (cover sheet & document(s))	
2. <input type="checkbox"/> Applicant claims small entity status. See 37 CFR 1.27		8. <input type="checkbox"/> Certified Copy of Priority Document(s) (if foreign priority is claimed)	
3. <input checked="" type="checkbox"/> Specification <span style="float: right;">Total Pages <input type="text" value="43"/></span> <small>(preferred arrangement set forth below)</small>		9. <input checked="" type="checkbox"/> Power of Attorney or Authorization of Agent	
■ Descriptive Title of the Invention		10. <input checked="" type="checkbox"/> 37 CFR 3.73(b) Statement	
■ Cross Reference(s) to Related Case(s)		11. <input type="checkbox"/> Preliminary Amendment	
■ Statement Regarding Fed sponsored R & D		12. <input type="checkbox"/> Information Disclosure Statement & PTO-1449 <input type="checkbox"/> Copies of IDS Citation(s)	
■ Background of the Invention		13. <input type="checkbox"/> Nonpublication Request Under 35 U.S.C. 122 (b)(2)(B)(i). Applicant must attach form PTO/SB/35 or its equivalent	
■ Brief Summary of the Invention		14. <input checked="" type="checkbox"/> Return Postcard	
■ Brief Description of the Drawing(s)		15. <input type="checkbox"/>	
■ Detailed Description		16. <input type="checkbox"/>	
■ Claim or Claims		17. <input type="checkbox"/>	
■ Abstract of the Disclosure			
4. <input checked="" type="checkbox"/> Drawing(s) (35 U.S.C. 113) <span style="float: right;">Total Sheets <input type="text" value="9"/></span>			
5. Combined Declaration and Power of Attorney			
a. <input type="checkbox"/> New Declaration <span style="float: right;">Total Pages <input type="text" value="4"/></span>			
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b. <input checked="" type="checkbox"/> Copy from a prior application (37 CFR 1.63(d)) <small>(for continuation/divisional with Box 18 completed)</small>			
i. <input type="checkbox"/> DELETION OF INVENTOR(S) Signed statement attached deleting inventor(s) named in the prior application, see 37 CFR 1.63(d)(2) and 1.33(b).			
6. <input type="checkbox"/> Application Data Sheet. See 37 CFR 1.76			
		<b>ADDRESS TO:</b> Commissioner for Patents P.O. Box 1450 Alexandria, VA 22313-1450	
18. If a <b>CONTINUING APPLICATION</b> , check appropriate box and supply the requisite information below and in a preliminary amendment or in an Application Data Sheet under 37 CFR 1.76: <input checked="" type="checkbox"/> Continuation <input type="checkbox"/> Divisional <input type="checkbox"/> Continuation-in-part (CIP) of prior application No: <u>09/848,394</u> Prior application information: Examiner: <u>Moustafa M. Meksy</u> Group/Art Unit: <u>2157</u> <b>For CONTINUATION OR DIVISIONAL APPS only:</b> The entire disclosure of the prior application, from which an oath or declaration is supplied under Box 5b, is considered a part of the disclosure of the accompanying continuing or divisional application and is hereby incorporated by reference. The incorporation can only be relied upon when a portion has been inadvertently omitted from the submitted application parts.			
<b>19. CORRESPONDENCE ADDRESS</b>			
<b>34415</b>			
<input checked="" type="checkbox"/> Customer Number			
Name (Print/Type)		Registration No. (Attorney/Agent)	
Brian M. Hoffman		39,713	
Signature		Date	
		3/7/05	

20423/10036/SF/5138562.1

Effective on 12/08/2004. Fees pursuant to the Consolidated Appropriations Act. 2005 (H.R. 4818).		<b>Complete if Known</b>	
<b>FEE TRANSMITTAL</b> <b>For FY 2005</b>		Application Number	NOT YET KNOWN
		Filing Date	HEREWITH
		First Named Inventor	Sandeep K. Singhal
		Examiner Name	UNASSIGNED
		Art Unit	UNASSIGNED
<input type="checkbox"/> Applicant claims small entity status. See 37 CFR 1.27		Attorney Docket No.	20423-10036
TOTAL AMOUNT OF PAYMENT (\$) 1,200.00			

<b>METHOD OF PAYMENT</b> (check all that apply)	
<input checked="" type="checkbox"/> Check <input type="checkbox"/> Credit Card <input type="checkbox"/> Money Order <input type="checkbox"/> Other (please identify):	
<input type="checkbox"/> Deposit Account    Deposit Account Number: <u>19-2555</u> Deposit Account Name: <u>Fenwick &amp; West LLP</u>	
<input checked="" type="checkbox"/> Charge any additional fee(s) or underpayments of fee(s) under 37 CFR 1.16 and 1.17 <input checked="" type="checkbox"/> Credit any overpayments	

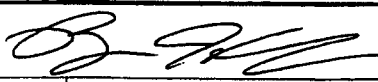
<b>FEE CALCULATION</b>							
<b>1. BASIC FILING, SEARCH, AND EXAMINATION FEES</b>							
	<b>FILING FEES</b> <b>Small Entity</b>		<b>SEARCH FEES</b> <b>Small Entity</b>		<b>EXAMINATION FEES</b> <b>Small Entity</b>		
<b>Application Type</b>	<b>Fee (\$)</b>	<b>Fee (\$)</b>	<b>Fee (\$)</b>	<b>Fee (\$)</b>	<b>Fee (\$)</b>	<b>Fee (\$)</b>	<b>Fees Paid (\$)</b>
Utility	300	150	500	250	200	100	1,000
Design	200	100	100	50	130	65	
Plant	200	100	300	150	160	80	
Reissue	300	150	500	250	600	300	
Provisional	200	100	0	0	0	0	
<b>2. EXCESS CLAIM FEES</b>							
<b>Fee Description</b>						<b>Small Entity</b> <b>Fee</b> <b>Fee</b>	
Each claim over 20 or, for Reissues, each claim over 20 and more than in the original patent						50    25	
Each independent claim over 3 or, for Reissues, each independent claim more than in the original patent						200    100	
Multiple dependent claims						360    180	
<b>Total Claims</b>	<b>Extra Claims</b>	<b>Fee (\$)</b>	<b>Fee Paid (\$)</b>	<b>Multiple Dependent Claims</b>			
				<b>Fee (\$)</b>	<b>Fee Paid (\$)</b>		
24	- 20 or HP = 4	x 50 =	200	0	0		
HP = highest number of total claims paid for, if greater than 20							
<b>Total Claims</b>	<b>Extra Claims</b>	<b>Fee (\$)</b>	<b>Fee Paid (\$)</b>				
3	- 3 or HP = 0	x 0 =	0				
HP = highest number of independent claims paid for, if greater than 3							
<b>3. APPLICATION SIZE FEE</b>							
If the specification and drawings exceed 100 sheets of paper, the application size fee due is \$250 (\$125 for small entity) for each additional 50 sheets or fraction thereof. See 35 U.S.C. 41(a)(1)(G) and 37 CFR 1.16(s).							
<b>Total Sheets</b>	<b>Extra Sheets</b>	<b>Number of each additional 50 or fraction thereof</b>		<b>Fee (\$)</b>	<b>Fee Paid (\$)</b>		
52	- 100 = 0	/ 50 = (round up to a whole number)		x	= 0		
<b>4. OTHER FEE(S)</b>							
Non-English Specification, \$130 fee (no small entity discount)						<b>Fees Paid (\$)</b>	
Assignment:							
Other:							

<b>SUBMITTED BY</b>			
Signature			Registration No.: 39,713 (Attorney/Agent)
Name (Print/Type)	Brian M. Hoffman		Telephone: (415) 875-2484  Date: <u>3/7/05</u>

Effective on 12/08/2004. Fees pursuant to the Consolidated Appropriations Act. 2005 (H.R. 4818).		Complete if Known	
<b>FEE TRANSMITTAL</b> <b>For FY 2005</b>		Application Number	NOT YET KNOWN
		Filing Date	HEREWITH
		First Named Inventor	Sandeep K. Singhal
		Examiner Name	UNASSIGNED
		Art Unit	UNASSIGNED
<input type="checkbox"/> Applicant claims small entity status. See 37 CFR 1.27		Attorney Docket No.	20423-10036
TOTAL AMOUNT OF PAYMENT (\$) 1,200.00			

<b>METHOD OF PAYMENT</b> (check all that apply)	
<input checked="" type="checkbox"/> Check <input type="checkbox"/> Credit Card <input type="checkbox"/> Money Order <input type="checkbox"/> Other (please identify):	
<input type="checkbox"/> Deposit Account    Deposit Account Number: <u>19-2555</u>	Deposit Account Name: <u>Fenwick &amp; West LLP</u>
<input checked="" type="checkbox"/> Charge any additional fee(s) or underpayments of fee(s) under 37 CFR 1.16 and 1.17	<input checked="" type="checkbox"/> Credit any overpayments

<b>FEE CALCULATION</b>							
<b>1. BASIC FILING, SEARCH, AND EXAMINATION FEES</b>							
	FILING FEES		SEARCH FEES		EXAMINATION FEES		
	Small Entity		Small Entity		Small Entity		
<u>Application Type</u>	<u>Fee (\$)</u>	<u>Fee (\$)</u>	<u>Fee (\$)</u>	<u>Fee (\$)</u>	<u>Fee (\$)</u>	<u>Fee (\$)</u>	<u>Fees Paid (\$)</u>
Utility	300	150	500	250	200	100	1,000
Design	200	100	100	50	130	65	
Plant	200	100	300	150	160	80	
Reissue	300	150	500	250	600	300	
Provisional	200	100	0	0	0	0	
<b>2. EXCESS CLAIM FEES</b>							
<u>Fee Description</u>						<u>Fee</u>	<u>Fee</u>
Each claim over 20 or, for Reissues, each claim over 20 and more than in the original patent						50	25
Each independent claim over 3 or, for Reissues, each independent claim more than in the original patent						200	100
Multiple dependent claims						360	180
<u>Total Claims</u>	<u>Extra Claims</u>	<u>Fee (\$)</u>	<u>Fee Paid (\$)</u>	<u>Multiple Dependent Claims</u>	<u>Fee (\$)</u>	<u>Fee Paid (\$)</u>	
24	- 20 or HP = 4	x 50 =	200	0		0	
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<u>Total Claims</u>	<u>Extra Claims</u>	<u>Fee (\$)</u>	<u>Fee Paid (\$)</u>				
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<u>Total Sheets</u>	<u>Extra Sheets</u>	<u>Number of each additional 50 or fraction thereof</u>	<u>Fee (\$)</u>	<u>Fee Paid (\$)</u>			
52	- 100 = 0	/ 50 = (round up to a whole number)	x	=		0	
<b>4. OTHER FEE(S)</b>							
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Assignment:							
Other:							

<b>SUBMITTED BY</b>			
Signature		Registration No.: 39,713 (Attorney/Agent)	Telephone: (415) 875-2484
Name (Print/Type)	Brian M. Hoffman		Date: <u>3/7/05</u>

**TECHNIQUE FOR ENABLING REMOTE DATA ACCESS AND  
MANIPULATION FROM A PERVASIVE DEVICE**

**INVENTORS**

**SANDEEP K. SINGHAL  
BARRY E. LEVINSON  
DARREN M. SANDERS**

**CROSS-REFERENCE TO RELATED APPLICATION**

**[0001]** This application is a continuation of prior Application No. 09/848,394, filed May 3, 2001, which is hereby incorporated herein by reference.

**FIELD OF THE INVENTION**

**[0002]** The present invention relates to pervasive computing, and more particularly to methods, systems, and computer program instructions for enabling users of pervasive devices (such as limited-function mobile devices, smart appliances, etc.) to remotely access and manipulate information in ways that might otherwise be impossible or impractical because of inherent limitations of the device.

**BACKGROUND OF THE INVENTION**

**[0003]** Pervasive devices (also referred to as "pervasive computing devices") have become popular in recent years as people increasingly seek "anywhere, anytime" access to services such as voice and data communications. Many pervasive devices are designed to be mobile, and may equivalently be referred to as "mobile devices" or "mobile computing devices". Examples of mobile pervasive devices range from two-way pagers to personal digital assistants, or "PDAs" (such as the Palm Pilot, Handspring

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Case 10036

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MANIPULATION FROM A PERVERSIVE DEVICE**

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BARRY E. LEVINSON  
DARREN M. SANDERS**

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filed May 3, 2001, which is hereby incorporated herein by reference. *now US Pat. No. 6,925,481*

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Visor™, or Compaq iPAQ) to cellular phones (such as the Nokia 6110) to multi-function devices (such as the Nokia 9110 or Qualcomm “pdQ™” smartphone). (“Visor” is a trademark of Handspring, and “pdQ” is a trademark of QUALCOMM Incorporated.) All pervasive devices are not necessarily mobile, however. Examples of this latter category include smart appliances for the home or business setting, devices which are permanently mounted in automobiles, and so forth.

**[0004]** Pervasive devices typically share several common characteristics:

- 1) limited processor speed;
- 2) limited memory capacity;
- 3) small size, which limits the richness of the data input and output interfaces (for example, small screen, limited keypad, and so forth);
- 4) a limited amount of software pre-installed on the device; and
- 5) access to limited-bandwidth networks.

**[0005]** The inherent drawbacks of these characteristics are further exacerbated by:

- 1) the need to maximize the device’s relatively short battery life -- which in turn prevents additional processor power or memory capacity from being added to the device; and
- 2) the need to simplify use of the device -- which in turn reduces the desirability of supporting an “open” software installation platform in which arbitrary software packages might be added.

**[0006]** As people rely on pervasive devices for day-to-day information access tasks, they find that the experience can be extremely limiting. While pervasive devices

vary widely in functionality and in their capabilities, some general observations for an average pervasive device can be made. First, the device typically does not have sufficient memory to store all of the information that the user requires. Indeed, most of a user's files or data are normally stored on a desktop personal computer ("PC"), laptop, or corporate server. Moreover, the device's memory limitations often prevent the user from manipulating large files, such as graphics-intensive presentations (where it might be desirable, for example, to re-order the slides within a presentation). Second, the device typically does not have the software required to access all of the data that the user might wish to use. For example, most pervasive devices are unable to run common software applications such as Microsoft® Word or Microsoft® Powerpoint. ("Microsoft" is a registered trademark of Microsoft Corporation.) Some pervasive devices, such as two-way pagers from Research In Motion ("RIM"), do not usually have a Web browser installed, and therefore the user cannot render data formatted as Web documents. Third, the device often does not have the necessary drivers installed with which to support all the data manipulation operations the user might wish to perform. For example, pervasive devices typically do not have drivers to support operations such as printing and faxing. Similarly, pervasive devices typically do not have drivers for video graphics array ("VGA") adapters that would enable the device to display content to a projector (such as a liquid crystal display, or "LCD," projector).

**[0007]** Some pervasive devices would not be considered as limited in function, although they may suffer from some of the drawbacks of limited-function devices such as poor ease-of-use (having, for example, a small screen size). Examples include the Compaq iPAQ Home Internet Appliance IA-1 and the Audrey™ home appliance from



3Com Corporation. ("Audrey" is a trademark of 3Com Corporation.) The term "Wireless Information Device", or "WID", will be used hereinafter to refer to this type of pervasive device as well as limited-function pervasive devices. (This term recognizes the fact that both the limited-function and full-function pervasive computing devices typically communicate using wireless communication techniques and protocols, such as 802.11, Bluetooth, and so forth.)

**[0008]** Various attempts have been made to address the limitations of WIDs; however, existing approaches fail to provide a satisfactory solution.

**[0009]** One existing approach to addressing the limitations of WIDs involves the technique of "transcoding" content into a form that is better suited for the WID. Products such as the WebSphere® Transcoding Publisher from International Business Machines ("IBM") Corporation and Spyglass Prism from Open TV, Inc. represent examples of this class of solution. ("WebSphere" is a registered trademark of IBM.) Through transcoding, the content is programmatically manipulated for a target device. For example, the transcoding process may enable the content to be rendered effectively on a small-screen device (perhaps by altering font size, removing image files, and so forth). Typically, a "transcoding engine" located on a server or network device receives the content in its original form, performs a conversion process, and delivers the renderable format to the client device. However, these transcoding solutions only address the need to view content: they do not provide a capability to manipulate the content from the WID. For example, the transcoding process does not enable the WID to e-mail, fax, print, or project the content.

**[0010]** Another approach to addressing the limitations of WIDs involves supplementing the capabilities of the WID through the deployment of hardware adapters or software. For example, a special-purpose attachment (known as a “Springboard™” module) may be plugged into a Handspring Visor device to enable the device to perform additional functions such as viewing and projecting Microsoft PowerPoint files. (“Springboard” is a trademark of Handspring.) The Presenter-to-Go™ module from Margi Systems, Inc. is one instance of such an attachment. (“Presenter-to-Go” is a trademark of Margi Systems, Inc.) As another example, software may be installed on a Microsoft Pocket PC device to enable the device to print Microsoft Word files to a limited set of printers. The PrintPocketCE software from FieldSoftware Products is one instance of such a software product. However, these client-centric add-on approaches increase the cost of the WID solution significantly and sometimes far exceed the cost of the WID itself. They also require additional power, effectively reducing the WID’s available battery life. Each add-on solution typically supports only a single data manipulation option (or a very limited set of options), for only a limited set of file formats (or in some cases, for a single file format). Several different add-ons may therefore be needed to enable a WID to meet a particular user’s requirements. An additional disadvantage of this approach is that the extra hardware is often bulky and inconvenient to carry, whereas additional software often requires a complex installation process by end-users, consumes valuable memory on the WID, and may not interoperate effectively with existing software loaded on the WID.

**[0011]** Therefore, what is needed is a technique for enabling WIDs to access and manipulate data that avoids the limitations of the prior art.

## SUMMARY OF THE INVENTION

**[0012]** The present invention is directed to methods, systems, and computer program instructions for enabling wireless information devices to access and manipulate data. The data being accessed may reside on a Web server, a file server, a personal desktop PC, or elsewhere. The data may represent virtually any type of information, including Web content, e-mail messages, or files in various formats. The data manipulation operations that are provided through use of the present invention may include viewing, faxing, printing, and projecting the data, as well as delivering the data to a voice messaging system.

**[0013]** Note that the discussion herein is primarily in terms of a limited set of data manipulation tasks or operations. These operations are discussed for purposes of illustration, and not of limitation. Many other manipulation operations might be provided in an implementation of the present invention, including modifying or changing data in some way; converting data from one format to another; transferring data from one device to another (e.g. to a remote file server for storage); publishing the data to a Web site; importing data (including a file or document) into a repository; disseminating data to one or more recipients (such as by sending e-mail messages); attaching data to a workflow message; controlling a remote application (such as launching and paging through a remotely hosted PowerPoint presentation); and so forth.

**[0014]** Enabling WIDs to easily access a wide variety of types of data and to initiate a wide variety of manipulations on that data in an efficient, cost-effective manner

-- in spite of the device's inherent limitations (such as limited processor capacity, limited embedded software, and/or limited bandwidth capability) -- is a primary objective of the present invention.

**[0015]** In preferred embodiments, the techniques of the present invention provide these advantages without requiring the installation of new software or hardware on the WID, in a manner that is easily extensible to support new manipulation operations and new data types.

**[0016]** Objectives of the present invention are realized by a solution that comprises one or more proxies, zero or more agents, and a data manipulation server (hereinafter, "DMS"). The DMS provides information about what services may be performed, and how to invoke those services. The DMS also performs operations on behalf of the WID, in cooperation with the proxies and the agents. In preferred embodiments, the proxies, agents, and DMS are not located within the WID, but instead are accessed by sending one or more request messages from the WID. This solution enables the WID's capabilities to be augmented in a very flexible yet powerful and cost-effective manner, without requiring any modifications to be made to the WID itself.

#### **BRIEF DESCRIPTION OF THE DRAWINGS**

**[0017]** FIG. 1 provides a block diagram which depicts an architecture and components of a preferred embodiment of the present invention.

**[0018]** FIGS. 2A and 2B illustrate examples of a table in which information about available data access and/or manipulation services is stored, according to a preferred embodiment of the present invention.

**[0019]** FIG. 3 provides a flowchart that depicts logic with which a WID accesses data and receives information about what manipulation operations are available on that data, according to a preferred embodiment of the present invention.

**[0020]** FIG. 4 provides a flowchart that depicts logic with which a WID requests a manipulation service upon data it has accessed, and with which that service is performed, according to a preferred embodiment of the present invention.

**[0021]** FIGS. 5A – 5I provide syntax examples that are used in describing operation of a preferred embodiment of the present invention.

**[0022]** FIGS. 6A and 6B illustrate samples of graphical user interface (“GUI”) displays that may be used to display available service information, according to the present invention.

#### **DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS**

**[0023]** The present invention will now be described more fully hereinafter with reference to the accompanying drawings, in which a preferred embodiment of the invention is shown. Like numbers refer to like elements throughout.

**[0024]** Flowchart illustrations of aspects of the present invention are described below. The logic of these flowcharts may be provided as methods, systems, and/or

computer program instructions embodied on one or more computer readable media, according to an embodiment of the invention. As will be obvious to one of ordinary skill in the art, these flowcharts are merely illustrative of the manner in which the associated aspects of the present invention may be implemented, and changes may be made to the logic that is illustrated therein (for example, by altering the order of operations shown in some cases, by combining operations, etc.) without deviating from the inventive concepts disclosed herein.

**[0025]** The present invention provides an efficient, cost-effective technique for enabling a wireless interface device to easily access a wide variety of types of data and to initiate a wide variety of manipulations on that data, without requiring the installation of new software or hardware on the WID, and in a manner that is easily extensible to support new manipulation operations and new data types.

**[0026]** Fig. 1 illustrates a preferred architecture and components of a system in which the present invention operates. The system may provide support for multiple WIDs, although only one WID 130 is illustrated in Fig. 1. The WID, which in preferred embodiments is a commercially-available WID which may be provided by any one of a number of vendors, includes at least one software application with which a user interacts to access and/or manipulate data. In preferred embodiments, this user-interaction software application is the only software required on the WID to enable use of the present invention. This user-interaction software preferably comprises a browser implementation (such as a Web browser); in alternative embodiments, other types of user-interaction software applications (including, but not limited to, e-mail client software) may be used. The user-interaction software application may be installed on the WID when it is

marketed, and may be a commercially-available software implementation. When browser software is present, it preferably supports at least one markup language. Examples of markup languages that may be supported include the Hypertext Markup Language ("HTML"); Wireless Markup Language ("WML"); and Voice Extensible Markup Language ("VoiceXML").

**[0027]** Note that while preferred embodiments of the present invention operate with commercially-available WIDs and without requiring hardware or software modifications or add-ons, in alternative embodiments the WID may be specifically adapted for use with the present invention, without deviating from the inventive concepts disclosed herein. For example, a WID might include modifications to provide a user interface tailored for use with the present invention, or perhaps code for optimizing data access and/or manipulation processing. Moreover, auxiliary software may be provided to provide enhanced authentication, encryption, compression, or similar functions that augment the transmission of data described herein. Furthermore, while the preferred embodiment anticipates invocation by user interaction (and user-interaction software), there may be implementations in which automated or programmatic invocation is appropriate. In these cases, software which embodies the automated or programmatic invocation may replace the previously-described user-interaction software as the only software required on the WID to enable use of the present invention. Or, the two forms of invocation software may co-exist on a WID.

**[0028]** At least one protocol proxy 120 is provided, according to the teachings of the present invention. A protocol proxy provides a bridge between the client (i.e. an application executing on WID 130) and the information that it seeks to access and

manipulate. A protocol proxy is responsible for accessing information on behalf of the client and (in preferred embodiments) annotating this accessed information with information about the manipulation services available for that accessed information. (The annotation process is described in more detail below, with reference to Block 350 of Fig. 3.) The information may be accessed, for example, from its location on one or more Web content servers in the World Wide Web (hereinafter, "Web") 110, in a distributed file system 150 of the prior art, or from an application of the prior art. This content server may deliver content that includes services which have been "pre-added" to the content (e.g. by querying the DMS directly), so that the protocol proxy is not required to provide additional annotations. This latter situation may be particularly beneficial, for example, if the content server happens to be co-located with the DMS.

**[0029]** Preferred embodiments of the present invention include at least one of the following types of protocol proxy: (1) a Hypertext Transfer Protocol ("HTTP") proxy, (2) a Wireless Session Protocol ("WSP") proxy, and (3) a Simple Mail Transfer Protocol ("SMTP"), Post Office Protocol ("POP" or "POP3"), or Internal Message Access Protocol ("IMAP") proxy. An HTTP proxy handles requests for and reception of information using HTTP request and response messages. A WSP proxy handles requests for and reception of information using WSP request and response messages. SMTP, POP, and IMAP proxies handle requests for and reception of electronic mail respectively using SMTP, POP, and IMAP request and response messages.

**[0030]** Alternative embodiments may include different and/or additional protocol proxy types. For example, a synchronization protocol proxy may be included, which may be used to synchronize data stored locally on a user's WID with data stored elsewhere



(such as on the user's desktop PC). An example synchronization protocol is "SyncML" which is being developed by The SyncML Initiative to seamlessly synchronize wireless and wireline data and devices. (See <http://www.syncml.org> for more information on SyncML.)

**[0031]** The protocol proxies in a particular implementation of the present invention may each run on different hosts if desired, and individual protocol proxies may be co-located with other components of the system. The protocol proxy function described herein may be replicated, if desired (for example, to administratively separate different types of proxy function, for purposes of fault tolerance or fault isolation, for scalability and load balancing, etc.) Moreover, a single proxy may itself be divided into separate components. For example, an HTTP proxy may include a first component that determines whether the request is for content on the Web or perhaps on a file server; a second component that handles those requests which are for Web content; and a third component that handles those requests which are for content from a file server. The multiple components may, in turn, be distributed across multiple machines.

**[0032]** In one embodiment, prior art configuration mechanisms are used to adapt the WID for communicating with a protocol proxy. For example, the client Web browser may be instructed to communicate with an HTTP proxy, or synchronization software on the WID may be configured to send synchronization protocol messages to the synchronization protocol proxy. In this embodiment, the protocol proxy then intercepts outbound messages from the client on the WID and processes those messages as disclosed herein. In another embodiment, a WID communicates with a protocol proxy through a wireless access point (not shown in Fig. 1), such as an 802.11 access point or a

Bluetooth access point (the functioning of which is known in the art). In this latter embodiment, the access point or an adapter device communicating with the access point receives outbound messages from the WID and evaluates those messages to determine which protocol is in use. The access point or adapter device then routes the outbound message to the appropriate protocol proxy. (This latter embodiment is preferred in the present invention because it avoids the need to configure the WID.)

**[0033]** Zero or more file access proxies 140 are also provided, according to the present invention. File access proxies may be located on various file servers, desktop computers, database systems, or other storage devices, and provide access to data stored in one or more repositories 150 which are located on (or otherwise accessible to) those machines. A particular file access proxy may access data from a local repository, within remote data stores (such as information that is accessible from a remote file server or Web server), information stored within local applications (such as stored e-mail messages), and/or information stored within remote applications (such as information that is accessible through a database or directory application). Accessible information may be dynamically generated by the local or remote application, such as a live sensor reading.

**[0034]** A data manipulation server 160 is provided, according to the present invention. In preferred embodiments, the DMS has two roles. One role is to provide data manipulation services. Another role is to maintain a repository of the available services for various types of data and to make this information available.

**[0035]** While not shown in Fig. 1, it may be desirable in some situations to have multiple data manipulation servers 160, for example for purposes of availability or load

balancing or administrative control. Furthermore, the DMS may be located within a cluster. The function of the DMS may optionally be partitioned, with different services hosted on different DMS's.

**[0036]** In its role of providing data manipulation services, those services may be provided by the DMS either directly, or indirectly by invoking one or more data output agents 170 (which are described below). For example, the DMS may directly manipulate content by performing a conversion of the content into HTML upon receiving a conversion request from the WID. As another example, the DMS may indirectly manipulate content by forwarding the content to a file manipulation agent, where that file manipulation agent is responsible for storing the content in a repository. In simple cases, the DMS may operate in a "pass-through" mode wherein it merely forwards content to a data output agent (such as a file manipulation agent). In most cases, however, the DMS performs operation-specific processing of the data received from the client before determining whether and where to forward data that may need further processing by an agent. In general, the data manipulation operations provided by the DMS may be arbitrarily complex, and operate in a content-dependent manner. In some cases, manipulation requests received from the WID may imply other manipulations that need to be performed. As one example, if a request is received from the WID to fax content to a recipient, the DMS preferably invokes a conversion process (which may be provided by the DMS, by a data output agent, or perhaps by another component of the system) to transform the content into Tag Image File Format ("TIFF"), where the resulting TIFF document is then sent to a data output agent responsible for performing facsimile transmission. As another example, if a request for printing a Web page is received from

the WID, the DMS first accesses the content of the Web page by retrieving it from the Web (or perhaps from cache storage) and then forwards that content to a selected data output agent which is responsible for print services. More information on the data manipulation processing provided by the DMS is provided below, with reference to Fig. 4.

**[0037]** In its role as a repository of available services, the DMS preferably maintains a table (or a list or other analogous structure, referred to hereinafter as a "table" for ease of reference) to identify those services. At run-time, this table is used to provide the WID with a list of the available data manipulation services for particular data content. The table is preferably organized according to file content type. An example is shown in Fig. 2A, which indicates that files of type "XML" may be converted to WBXML ("Wireless Application Protocol Binary XML") decks (see 205) or faxed to recipients (see 210), whereas files of type "ASCII" may be sent as e-mail (see 215). In this example, the file content type appears first, in column 200; an identification of the service appears next, in column 201; and an address of the service (i.e. a service invocation address, described below) appears in column 202. The service identification from column 201 may, for example, be presented to a user on a user interface to enable user selection of the corresponding service.

**[0038]** Alternatively, the table may be organized in a different manner. Furthermore, the entries in the table may optionally provide for further qualifying the services, such that the availability of a particular service depends on additional factors beyond the file content type. Examples of such factors include: (1) identification of individual users or user groups; (2) user privileges or access rights; (3) particular

locations from which a service will be available; (4) the target WID type; and (5) combinations of such factors. Fig. 2B provides an example of this optional further qualification, wherein the example table is organized according to file content type (in column 250), user identification (in column 251), and location (in column 252). The service is identified in column 253, and the service invocation address appears in column 254. As illustrated therein, the print service is available with all files and all locations (indicated by presence of a wildcard symbol “\*”) for user A (see 255), whereas printing is only available to user B for files of type “.doc” and only while he is located in Conference Room C (see 260).

**[0039]** When user identifying information is stored in the DMS’ table for use as a factor in service availability, it may be represented in several alternative formats, such as: the user’s name; a department number to which an authorized user must belong; an Internet Protocol (“IP”) address (which may optionally identify a user group, e.g. through a subnet mask) of the user’s WID; and so forth. Similarly, location information used as a factor in service availability may be represented in several alternative manners. Location information is further described below, with reference to Block 340 of Fig. 3. Some factors used in determining service availability, such as user access rights or privileges, may require dynamically querying a directory or similar repository at run-time to determine availability. Information used in the retrieval may in some cases be obtained from the request message issued by the client (e.g. from header values in HTTP requests). Techniques for performing this type of dynamic look-up processing are well known in the art, and will not be described in detail herein.

**[0040]** The examples in Figs. 2A and 2B use a simplified format for purposes of illustration. In an actual implementation, the entries in the tables may vary from the format shown. For example, the identification of the available service may perhaps be represented using numeric identifiers, rather than textual descriptions. In this case, the WID may optionally contain software adapted for use with the numeric codes, and may translate the codes into text before displaying a list of available services to the user. Or, this translation might be performed by the protocol proxy before the available services list is returned to the WID. The table might also contain an identification of an icon or graphic symbol corresponding to selected ones of the available services, where this icon or symbol can be displayed to the user on the WID. The table might also contain multiple versions of the textual or graphical descriptions, to accommodate presentation in different languages.

**[0041]** A "service invocation address" is specified for each service (see the examples in columns 202 and 254 of Figs. 2A and 2B, respectively) and indicates an address at which the service may be invoked. In preferred embodiments, these addresses are provided as Uniform Resource Locators ("URLs"). Preferably, the addresses are specified within the entries stored in the DMS's table, as shown in the example tables of Figs. 2A and Fig. 2B, although alternatively the addresses may be separately stored (perhaps as a storage optimization). As an example of using the latter approach, a print service might appear many times in the DMS' table. To eliminate redundant storage of this service's URL, the URL might be correlated to the print service but separately stored, enabling individual table entries such as 255 and 260 in Fig. 2B (which specify qualifiers on when printing is available) to be associated with the proper URL at run-time even

though column 254 is omitted. Similarly, separate storage may be desirable in cases where the appropriate URL to use for creating the available services list is determined dynamically at run-time.

**[0042]** Note that while the service invocation addresses used herein as examples specify locations on a DMS, this is for purposes of illustration and not of limitation. One or more of the URLs may alternatively identify services provided at locations other than the DMS.

**[0043]** In alternative embodiments, service invocation addresses may employ address formats other than URLs, such as e-mail addresses, or perhaps a combination of an e-mail address and subject line, to designate a service to be invoked.

**[0044]** When requested information is delivered to a client application on the WID, a list of service invocation addresses for the available services is provided along with that information (as will be discussed in more detail with reference to Block 350 of Fig. 3). Each service invocation address is preferably augmented with an identity of the information that is to be operated upon. In some cases, it may be possible to infer the information identity from the service invocation address, in which case this augmentation is not required. For example, a service invocation address might identify a Structured Query Language ("SQL") query whose result is implicitly the data being manipulated.

**[0045]** Returning now to Fig. 1, one or more data output agents 170, which implement specific output manipulation operations (such as printing, faxing, projecting, or delivering to a voice mail system, the details of which do not form part of the present invention), are provided. (Note that a data output agent, as the term is used herein, refers

to a component that delivers file content to an output device, whereas a file access proxy as defined herein retrieves file content in read-only mode. In some instances, a data output agent and a file access proxy may be co-located, and furthermore these functions may be implemented within a single software component.) The DMS passes data to selected ones of these agents to perform the manipulation services which are managed by the DMS. In preferred embodiments of the present invention, one or more of the following data output agents are supported:

- a print server agent, which is responsible for sending jobs to one or more printers;
- a projection server agent, which is responsible for driving the display of content to an LCD projector, video display, or other graphical terminal;
- a file manipulation server agent, which is capable of performing file operations such as copying, deleting, and renaming files (and which is typically co-located with a file access proxy);
- an e-mail manipulation server agent, which is capable of performing e-mail operations such as sending, receiving, and deleting e-mail messages (and which is typically co-located with a file access proxy that accesses e-mail files);
- a fax server agent, which is responsible for sending information for facsimile transmission; and
- a voice mail server agent, which is responsible for sending information for delivery through a voice messaging system.

**[0046]** The agents may send data to queues or other similar structures or processors, which may in turn be implemented as agents. For example, the output of a



print server agent may be sent to a selected print queue for printing (using queuing techniques which are well known in the art). An agent such as a print server may manage local resources, such as a locally-stored print queue for a particular printer, or remote resources, such as access to multiple printers (each of which typically has its own print queue processing). In degenerate cases, a print server agent may be manifested simply as a print queue. Similarly, other agents such as the fax server agent and projection server agent may be manifested as queues for their respective devices.

**[0047]** Referring now to Fig. 3, logic is illustrated that may be used to provide data access support for a WID, including delivery of a list of the manipulation operations that are available on that data. At Block 300, the client software on the WID issues a request for information. (This corresponds to request message flow 1 in Fig. 1. The encircled numbers in Fig. 1 all refer to message flows.) Typically, this request is initiated by action of the WID user. Block 310 indicates that a protocol proxy receives this request. As described earlier, the outbound request either may be received by the protocol proxy to which the client software has been configured to communicate, or may be received by a wireless access point or adapter device (which then inspects the content to determine which protocol proxy is required, and forwards the request to that proxy).

**[0048]** At Block 320, the protocol proxy forwards the request to the appropriate information source. For example, if the request is an HTTP request for Web content issued by a Web browser, then an HTTP proxy forwards that HTTP request to the Web. Or, if the request is for file content, it will be forwarded to a file access proxy. (This corresponds to message flow 2 or 3 in Fig. 1.) At Block 330, the protocol proxy receives

the response from the information source. (This corresponds to message flow 4 or 5 in Fig. 1.)

**[0049]** The protocol proxy then determines, in Block 340, which services are available to the WID for manipulating the returned content. This determination may be made in several ways. In a preferred embodiment, the protocol proxy issues a query to the DMS for a list of available services. (This corresponds to message flow 6 in Fig. 1.) Upon receiving the list from the DMS, the protocol proxy may optionally cache the list for use with subsequent requests (in order to avoid the message exchange and processing overhead of repeatedly requesting such information from the DMS). In an alternative embodiment, the protocol proxy may be statically pre-configured with a list of available services that are appropriate for particular types of content, users, locations, or other criteria as described previously with respect to Figs. 2A and 2B; in this case, message flow 6 of Fig. 1 is not required.

**[0050]** When queried by the protocol proxy at Block 340, the DMS consults its stored table entries (see Figs. 2A and 2B for examples), using logic that is adapted to the particular storage format in use by that DMS, and determines which services are available for the data being returned to the WID. As stated earlier, the available services are preferably filtered according to the type of content being returned, and may also (or alternatively) account for one or more other factors. (This filtering process has been discussed with reference to Figs. 2A and 2B, above.)

**[0051]** When an identification of the user is one of the factors used to determine service availability, the user's identification may be obtained in a protocol-specific

manner. For example, the user's identification may be available as the value of a cookie in an HTTP request or response header. Or, in some cases a look-up operation may be performed to obtain this information if a table or other similar repository of such information is available.

**[0052]** In preferred embodiments, the client software on the WID does not participate in data manipulation operations (rather, the request is sent to the DMS, which obtains the data and manages the manipulation operations), and therefore capabilities of the WID may not be of interest when determining the list of available services. However, there may be some cases where this information is deemed useful. For example, it may be known that user input is required for a particular manipulation operation (such as specifying the target of an e-mail message). If the target WID is incapable of supporting the necessary interactions, then that service is preferably omitted from the delivered list by the evaluation performed by the DMS at Block 340. When this type of processing is to be performed, information about the capabilities available on the WID may be obtained in a variety of ways, such as by inspecting the content types accepted according to the Accept header of an HTTP message, by assessing browser capabilities according to information provided in the User-Agent header of an HTTP message, by analyzing capability information explicitly provided by the device, or by inspecting a repository of capability information indexed by device identity. These approaches for determining client capabilities are well known in the prior art.

**[0053]** When information about the location of the WID is used as a factor in determining available services, this location information may also be obtained in various ways and once obtained, may be used in various ways. The location information may, for

example, be determined by querying a global positioning system ("GPS") function on the client. Or, the location information might be obtained by querying a Location Registry, such as the Location Registry described in commonly-assigned U. S. Patent \_\_\_\_\_ (serial number 09/848,441, filed concurrently herewith), which is entitled "Location-Aware Service Proxies in a Short-Range Wireless Environment" and which is incorporated herein by reference. As disclosed therein, a mobile device's access point (equivalently, a WID's access point) monitors its traffic to obtain the device's location. This location information, which preferably comprises a list of access points which are near the mobile device at a point in time, is maintained in the Location Registry. This Location Registry implements a query interface that may be used by an implementation of the present invention to determine the location of a particular WID. This related invention also discloses "Location Aware Service Proxies" that intercept requests initiated by mobile clients, and that use the location of the mobile device to determine which content to deliver to the mobile device. These location-aware service proxies may be used in conjunction with the present invention to determine what content may be delivered, and a protocol proxy may then annotate that content with available services information (where the set of available services may also be based on location, among other factors). Furthermore, a protocol proxy as disclosed herein may also function as a location-aware service proxy. In this latter case, the location-aware service proxy preferably performs further location-sensitive filtering on the available services list obtained from the DMS in Block 340. Or, alternatively, the location-aware service proxy may transmit location information to the DMS (e.g. on message flow 6 of Fig. 1), where the DMS then factors that information into its list-generation processing.

example, be determined by querying a global positioning system ("GPS") function on the client. Or, the location information might be obtained by querying a Location Registry, such as the Location Registry described in commonly-assigned U. S. Patent, *still pending* (serial number 09/848,441, filed concurrently herewith), which is entitled "Location-Aware Service Proxies in a Short-Range Wireless Environment" and which is incorporated herein by reference. As disclosed therein, a mobile device's access point (equivalently, a WID's access point) monitors its traffic to obtain the device's location. This location information, which preferably comprises a list of access points which are near the mobile device at a point in time, is maintained in the Location Registry. This Location Registry implements a query interface that may be used by an implementation of the present invention to determine the location of a particular WID. This related invention also discloses "Location Aware Service Proxies" that intercept requests initiated by mobile clients, and that use the location of the mobile device to determine which content to deliver to the mobile device. These location-aware service proxies may be used in conjunction with the present invention to determine what content may be delivered, and a protocol proxy may then annotate that content with available services information (where the set of available services may also be based on location, among other factors). Furthermore, a protocol proxy as disclosed herein may also function as a location-aware service proxy. In this latter case, the location-aware service proxy preferably performs further location-sensitive filtering on the available services list obtained from the DMS in Block 340. Or, alternatively, the location-aware service proxy may transmit location information to the DMS (e.g. on message flow 6 of Fig. 1), where the DMS then factors that information into its list-generation processing.

**[0054]** Once the protocol proxy has the list of available services, it preferably formats or annotates that list in Block 350. (In alternative embodiments, this function may be performed by the DMS before it returns the available services information to the protocol proxy.) In a preferred embodiment, this annotation comprises modifying the service invocation addresses to enable the WID's user to easily invoke each available service. For example, in the case of HTML content such as a Web page, the protocol proxy in this preferred embodiment adds a set of links (which may be represented as text or icons) to the list of available services that may be used to manipulate that HTML content. Preferably, the links take the form of a service invocation address that is parameterized with an identity of the information to be manipulated. Suppose, for example, that one of the available services is to print a Web page, and that the DMS has supplied the service invocation address shown in Fig. 5A for that print operation, where this syntax, in this example, identifies print service software on the DMS itself. Using the standard HTTP syntax for a parameter list, the Web page "www.reefedge.com" may be identified for printing by this print software by supplying the parameter list shown in Fig. 5B, which identifies the data being manipulated, thereby yielding an annotated link as shown in Fig. 5C.

**[0055]** As another example, suppose a Microsoft Word document named "report.doc", which is accessed from the root directory of a file server named "fileServer", is being returned to the WID, and that available services for this document include printing it and filing (i.e. storing) it on a file server. To print the document, the document may be identified for printing by the print software on the DMS by supplying

the sample syntax shown in Fig. 5D, where the parameter "file=//fileServer/report.doc" identifies the data being manipulated.

**[0056]** Alternatively, to identify the document for filing at a location "newServer/filesAccessedByWID/", the sample syntax shown in Fig. 5E may be used, where the value of the "dest" parameter identifies the new file storage location.

**[0057]** In the preferred embodiment, the service invocation address may be coupled with additional information during this annotation process in order to ensure that the DMS (and/or data output agent, as appropriate for a particular manipulation service) accesses and manipulates the required information. For purposes of illustration, suppose the user accessed a Web page for which cookie values were used in customizing the page content. As an example, the WID user's bank account number may have been transmitted in a cookie on the outbound HTTP request message, and this account number may have been used by a Web server to generate a Web page showing the user's current bank account balances. If, after viewing this customized Web page, the user decides that she would like to print the information, the DMS must be able to use this same page content when invoking the printing operation. Rather than forwarding the Web page from the WID to the DMS, the protocol proxy of the preferred embodiment captures the cookies that were present on the original HTTP request and includes those cookies as additional parameters on the annotated links created during the processing of Block 350. (Preferably, all cookies are stored and copied to the links, although if the protocol proxy is adapted to know that certain cookies are irrelevant, they may be omitted.) By preserving the cookies in the link annotations, the subsequent manipulation services invoked from the DMS will automatically have the same cookie values that were used in

processing the original request message, thereby ensuring that the manipulated content corresponds to the content delivered to the WID user. Fig. 5F provides an example of syntax that may be used to annotate a link with a cookie whose name is "acct\_nbr" and whose value is "123456". (Note that the DMS prepares the user's bank account information for printing in response to a data manipulation request indicated as message flow 8 in Fig. 1, and invokes the print process at a data output agent by issuing message flow 10 in Fig. 1. The processing performed by the DMS may further comprise obtaining bank account information by issuing message flow 9 in Fig. 1.)

**[0058]** This same approach may be used for form parameters that are submitted to a Web server (e.g. using an HTTP POST message). To encode the form parameter information in the URL, a parameter name such as "postParams" may be substituted for the "cookie" parameter name shown in Fig. 5F. A parameter name/value pair may then be listed, in an analogous manner to listing a cookie name/value pair.

**[0059]** A service invocation address may be coupled with any combination of cookies, form parameters, or other information.

**[0060]** When encoding cookies, form parameters, and other information in this manner, three issues should be considered. First, URL length is currently limited to 255 characters, according to the HTTP specification. Second, it is difficult to encode all character sets in URLs. Third, a DMS may in some cases be implemented within a Web client which is not able to programmatically control the sending of request data. For example, the DMS might use Microsoft Internet Explorer, which provides no programmatic way to force a cookie to be sent. To address these problems, the cookies,



form parameters, and so forth may be cached by the protocol proxy (i.e. when the original content is being processed). This cached information may then be used in three ways to construct a valid request for use with the present invention.

**[0061]** In a first approach, in the service invocation address URL, a parameter can be given by which the cached parameters can be obtained by the DMS from the protocol proxy. For example, “?params=http://protocolproxy/params/139x3e245” gives the DMS a URL from which the cached parameters, cookies, etc. can be obtained. The value “139x3e245” in this example is meant as a temporary code which represents the parameters associated with the particular request.

**[0062]** In a variation of this first approach, the parameter on the service invocation address URL may identify how to obtain the cached parameters from the cache, rather than from the protocol proxy.

**[0063]** In a second approach, the data URL may actually point to the protocol proxy itself. The protocol proxy, upon receiving the data request from the DMS, determines the real request and obtains the requested data on the DMS’ behalf. For example, “http://protocolproxy/request/139x3e245” might cause a request (along with the appropriate cookies, form parameters, and other information) to be issued from the protocol proxy to the true source of the data.

**[0064]** In a third approach, the DMS may request the content by itself using the protocol proxy, in much the same way that all requests from the WID were directed through the protocol proxy. However, the protocol proxy may annotate the data source with a tag that the protocol proxy can later use to reconstruct the original query. For

example, the protocol proxy might rewrite the content request URL to be "http://www.yahoo.com/?protocolproxy=139x3e245", so, upon receiving the request from the DMS, the protocol proxy may look up session 139x3e245 in its cache, obtain the necessary parameters, and forward the properly-formatted request to location "www.yahoo.com".

**[0065]** It is also possible that the protocol proxy might cache the data content (rather than the parameters). In this case, the content location provided by the protocol proxy might then point to that cache. There is then no need to provide cookies or parameters in the URL, because the DMS can obtain the full content from the cache. To achieve maximal performance and capacity in this situation, the cache is preferably capable of storing multiple versions of content associated with the same URL, with each version associated with a different combination of cookies, form parameters, and other request information.

**[0066]** Optionally, additional formatting information may be supplied as parameters on selected service invocation addresses during the annotation process of Block 350. These additional parameters may be provided for implementation-specific usage, including for customization of the data manipulation service. One example, described above, is to specify a destination address for a file that is being stored in a repository. As another example, suppose the data manipulation service is to send an e-mail message to a particular recipient. An example of invoking the "email" service, which is managed through the DMS at the location shown in Fig. 5G, to send a message identified as "msg98765.txt" to the recipient "lucy@ricardo.com" is shown in Fig. 5H.

**[0067]** As yet another example of adding parameters to service invocation addresses, it may be desirable in a file conversion service to supply parameter values to be used in guiding the conversion process. Suppose, for example, that the previously-discussed "report.doc" Microsoft Word document is being converted to HTML, and that the conversion software allows several different types of transformations, based upon identification of a particular template. The template may specify how to format the title, for example, and how to "chunk" the source document into different pieces, how links to those pieces are embedded, and so forth. If the template parameter value is "plain", for example, the conversion is adapted to returning plain text, whereas if the template parameter value is "segmented", then the conversion may generate a "chunked" document where each logical input segment appears on a different page, and perhaps failing to specify a template parameter value causes the entire document to be generated as a single HTML page. A sample service invocation address for viewing the converted file in segmented form is shown in Fig. 51.

**[0068]** Preferably, the annotation process of Block 350 generates separate annotated links for each valid option, such that when the user selects one of the links, all the necessary information is present for properly invoking the data manipulation service. (Note that the DMS prepares this file for viewing in response to a data manipulation request indicated as message flow 8 in Fig. 1, and returns the result for rendering on the WID at message flow 12 in Fig. 1. The processing performed by the DMS may further comprise obtaining the file content by issuing message flow 11 in Fig. 1.)

**[0069]** The parameter types supplied during the annotation process may be stored in, and obtained from, the DMS table along with the applicable service invocation

address. Or, the protocol proxy may provide service-specific code for determining which parameter types are applicable for a particular service.

**[0070]** While the preferred embodiment has been described in terms of embedding the service description directly into the content (e.g. as links in HTML), other alternative approaches may be used without deviating from the scope of the present invention. As one example, the annotation process may comprise generating a compound document which combines the original content (in HTML, WML, XML, etc.) and the service definition (in XML, or perhaps a similar well-structured markup language). In this approach, the service description may be embedded directly into the content. As another example, a multi-part MIME (Multi-purpose Internet Mail Extensions) message may be generated which contains the original content (in one part) and the service description (in another part). These alternative approaches provide different ways for conveying the list of available services.

**[0071]** Optionally, an implementation of the present invention may enable the protocol proxy itself to directly invoke data manipulation operations. For example, during the annotation processing in Block 350, the protocol proxy may wish to save the content being returned to the WID in response to its request message into a cache, for faster retrieval on subsequent requests. Or, the protocol proxy may determine that a data conversion operation is desirable, for example by converting an XML document to a WBXML deck. Preferably, the protocol proxy sends a data manipulation request message to the DMS for such processing, and the DMS then invokes the necessary file access proxy and/or other data output agent processing. Upon receiving the response from the DMS, the protocol proxy preferably delivers the resulting data to the WID in

addition to (or, alternatively, instead of) the originally accessed information. For example, if the original request was for a Web page, and the protocol proxy requests that this Web page be converted to a WBXML deck, then either the deck or the deck plus the Web page may be delivered to the WID, as appropriate in a particular implementation of the present invention. (As will be obvious, some types of DMS response are preferably never transmitted to the client, such as those responses or portions thereof which provide return code and status information.) This type of protocol proxy-initiated manipulation may be appropriate when software executing on the proxy can predict that the user would be likely to request the data manipulation operation, and the "automatic" invocation by the protocol proxy therefore serves to simplify the user's task. It is also appropriate when the protocol proxy can determine that the data in the accessed format cannot be presented on the WID without first performing a conversion. This latter type of determination may be made by inspecting the content types accepted by the WID, for example as indicated on the Accept header of the outbound HTTP request. In the preferred embodiment, the protocol proxy invokes a conversion service to convert all incoming Microsoft Word files to HTML or WML, because Microsoft Word files cannot be rendered natively on most WIDs. Other similar conversions may also be automatically provided. The list of available services to be delivered to the WID along with the content may be provided in terms of the originally-accessed content, or the manipulated content, or both, as appropriate in a particular situation.

**[0072]** Continuing on with Fig. 3, at Block 360, the content, along with the annotated list of available services, is returned to the WID. This corresponds to message flow 7 in Fig. 1. The WID then receives this information (Block 370) and preferably

displays the content and/or the available services list to the user. However, in alternative embodiments, the service list might be displayed separately from the document. A browser might import that service list and populate a dynamic menu, pop-up, service selection panel, or other custom user interface component. (As stated earlier, in some cases it may be desirable to include custom or modified client software on the WID for use with the present invention, such as software which provides a tailored user interface.)

**[0073]** Once the service list is available, the user may then invoke a selected service in order to initiate further manipulation of the delivered content. In response to the user's invocation, a request message will be sent to the location identified on the service invocation address (which, as illustrated herein, is preferably an address identifying a service on the DMS, but alternatively may be a service running elsewhere). This request message corresponds to message flow 8 in Fig. 1. The processing performed on the DMS in response to receiving the data manipulation request will be described with reference to the logic in Fig. 4.

**[0074]** In some cases, a WID may have pertinent data that is locally stored, such as information to be used when sending fax content to a recipient. After receiving a list of available services from the protocol proxy and selecting one of these services, the locally-stored data may be posted from the WID to the DMS, for use as the selected service executes.

**[0075]** Note that programmatic operations on the WID may invoke a data manipulation service in some cases, rather than the user performing the invocation. For example, the DMS may embed a script within the available services list, where this script

may autonomously invoke a manipulation service. Suppose, for purposes of illustration, that a WID issues a request to receive a current view of the user's calendar from his desktop PC. The data returned to the WID in response to the request may include one or more software-activated alarms. When the appropriate action occurs (such as the passage of time to reach a calendared alarm event), a data manipulation service identified in a script supplied by the DMS may be programmatically triggered to perform some alarm processing (such as printing the agenda for a scheduled meeting to the printer at the designated conference room).

**[0076]** Turning now to Fig. 4, logic is depicted that may be used to support processing when the WID requests a data manipulation service from the DMS. At Block 400, the WID issues a request for a particular service by invoking the provided (and possibly annotated) service invocation address. (This corresponds to message flow 8 in Fig. 1.) Note that all parameters for this invocation are already available (or indirectly indicated) on the service invocation address, having been supplied by the protocol proxy during the annotation process in Block 350 of Fig. 3. At Block 410, the DMS receives the request, and at Block 420, the DMS parses the annotated information in the request to determine the specified service invocation address, the identity of the data to be manipulated, and any other parameters that may be present. At Block 430, the DMS retrieves the identified data and may optionally manipulate it, according to the requirements of the particular data manipulation service being performed. For example, the DMS may know that a conversion service is necessary before performing the manipulation operation requested by the user, and may therefore automatically invoke such processing. As described earlier, if the user requests a fax service, then the DMS

may retrieve the data and convert it into a TIFF file prior to transmitting it to a fax agent, without requiring the user to explicitly request the conversion to TIFF. (The transmission to the fax agent occurs according to Block 450, described below.) The DMS may perform this processing directly, or by invoking a data output agent or other conversion software.

**[0077]** Preferably, the annotated service invocation address provides a complete description of the data to be manipulated, as has been shown in the examples herein. Alternatively, it may happen that the DMS needs to evaluate additional information in order to locate the data. For example, if a file name is received that does not specify a complete file path from a root directory, then the DMS preferably uses implementation-dependent techniques for resolving the location and directory path information. (Or, an error message may be returned in such cases, if desired.)

**[0078]** At decision Block 440, the DMS determines whether processing by a data output agent is required to complete the requested service. Each service implemented on the DMS is adapted to knowing what type of further processing is required and what agent(s) need to be invoked.

**[0079]** If the answer to the decision block is Yes, then control passes to Block 450 where a request to the appropriate data output agent is generated. The data output agent that is invoked is preferably determined according to the type of service to be performed, and optionally by evaluating other factors (such as the user's identity, the processing load on particular printers, current network conditions such as available bandwidth and/or outages, which data output agent supports the user's e-mail service or file system, and so



forth). The data output agent performs any necessary operations, using processing which is known in the prior art, to perform the requested data manipulation. For example, if the data output agent controls an LCD projector, then the data output agent retrieves the information to be projected, renders it, and makes the rendered information available to the associated projector (e.g. through a VGA output connector). Or, if the data output agent handles sending of e-mail messages, then the message to be sent is retrieved, formatted for delivery (if necessary), and transmitted.

**[0080]** In alternative embodiments, the DMS may choose to not retrieve selected data content until the data is required by the data output agent. This may be implemented by generating a special URL and passing this URL to the data output agent. When the data output agent needs the content, it requests that URL (from the DMS), and then the content is actually obtained (by the DMS, possibly through the protocol proxy) and delivered to the data output agent. This has the advantage of avoiding data retrieval until/unless it is needed, and avoids the need to "push" data to the data output agent.

**[0081]** As indicated at Block 460, the DMS then preferably receives a response message from the invoked data output agent. This response message may be simply a success or failure indication, or it may include additional information such as status information. For example, when a print service has been invoked, the response message may indicate that the print job has started (or is queued), which printer has the print job, where that printer is located, and so forth.

**[0082]** When the answer to decision Block 440 is No, and also following the processing of Block 460, at Block 470 the DMS generates a response to the WID that

requested the data manipulation service. Similar to the response message received at Block 460, this response message may indicate success or failure, and may include additional information about the status of the request. Optionally, the response may include a list of further data manipulation services that may be performed on the data that was sent to the WID at Block 370 of Fig. 3. In some cases, the DMS may return new content to the WID after invocation of the data manipulation service. In these cases, the response message sent in Block 470 preferably includes a newly-created list of services that are available for this new content. This processing may be performed by the DMS initiating a request to the protocol proxy for content at a URL that is actually served from the DMS, after which the protocol proxy will retrieve the content from the DMS and then query the DMS for the services list. The protocol proxy then annotates this list, and returns the content to the WID. This approach avoids duplication of the service annotation processing logic.

**[0083]** Turning now to Fig. 6A, a sample GUI display that provides available service information is illustrated, according to the present invention. This display shows an image of a Microsoft PowerPoint presentation file that has been retrieved by a file access proxy. The file has also been converted for display on the WID (e.g. to make the slides of the presentation viewable on the WID's display panel). This conversion may be performed automatically by the protocol proxy upon detecting that the requested content is a PowerPoint file and/or that the target WID cannot display files of this type, as discussed earlier. Along with the content 610 of the slide, four icons 601 – 604 have been provided in a header area 600 to enable the user to select from among four data manipulation services which are available for this content. The first icon 601 provides a

link to a home page; icon 602 may be selected to print the content; icon 603 may be selected to project the content; and icon 604 may be selected to log out of the system.

**[0084]** Fig. 6B provides another sample GUI display with available service information. This display shows an image 620 of a page retrieved from a Web server. Along with this content 620, three icons 601, 602, and 604 have been provided in header area 600. These icons represent the same functions discussed with reference to Fig. 6A. In this example, the printer icon 603 has been omitted, and the user therefore cannot request printing of the image. (It may be that there is no printer available for the WID's current location, or that the user is not authorized to access the printer, etc.)

**[0085]** As has been demonstrated, the present invention provides a number of advantages over prior art solutions for accessing and manipulating data content from a WID. The teachings which have been described do not require modifications of the WID, yet support a wide variety of data manipulation operations and a wide variety of content types. Furthermore, the supported operations and content types are easily extensible, again without requiring modifications to the WID.

**[0086]** The foregoing description of a preferred embodiment is for purposes of illustrating the present invention, and is not to be construed as limiting thereof. Although a preferred embodiment has been described, it will be obvious to those of skill in the art that many modifications to this preferred embodiment are possible without materially deviating from the novel teachings and advantages of this invention as disclosed herein. Accordingly, all such modifications are intended to be within the scope of the present invention, which is limited only by the claims hereafter presented (and their equivalents).

**CLAIMS**

We Claim:

1. A method of enabling data access and manipulation from a pervasive device, comprising the steps of:
  - receiving a data access request from a pervasive device;
  - obtaining the requested data;
  - determining what data manipulation operations are available for the obtained data; and
  - providing references to the determined data manipulation operations to the pervasive device.
2. The method of claim 1, wherein a reference to a determined data manipulation operation comprises a service invocation address.
3. The method of claim 1, further comprising the steps of:
  - receiving a request to perform a selected one of the determined data manipulation operations; and
  - performing the requested operation on behalf of the pervasive device.
4. The method of claim 1, wherein the determining step further comprises determining what data manipulation operations are available for a content type of the obtained data.
5. The method of claim 1, wherein the determining step further comprises determining what data manipulation operations are available for a user of the pervasive device.
6. The method of claim 1, further comprising the steps of:
  - determining a current location of the pervasive device; and

determining what data manipulation operations are available for the current location of the pervasive device.

7. The method of claim 1, wherein the determining step further comprises determining what data manipulation operations are available responsive to a type of the pervasive device.

8. The method of claim 1, further comprising the steps of:  
performing one or more data manipulation operations on the obtained data,  
thereby creating transformed data;  
determining what data manipulation operations are available for the transformed data; and  
providing references to the determined data manipulation operations for the transformed data to the pervasive device.

9. A computer program product having a computer-readable medium having computer program code encoded thereon for enabling data access and manipulation from a pervasive device, the computer program code adapted to perform steps comprising:  
receiving a data access request from a pervasive device;  
obtaining the requested data;  
determining what data manipulation operations are available for the obtained data; and  
providing references to the determined data manipulation operations to the pervasive device.

10. The computer program product of claim 9, wherein a reference to a determined data manipulation operation comprises a service invocation address.

11. The computer program product of claim 9, further comprising the steps of:  
receiving a request to perform a selected one of the determined data manipulation operations; and  
performing the requested operation on behalf of the pervasive device.

12. The computer program product of claim 9, wherein the determining step further comprises determining what data manipulation operations are available for a content type of the obtained data.

13. The computer program product of claim 9, wherein the determining step further comprises determining what data manipulation operations are available for a user of the pervasive device.

14. The computer program product of claim 9, further comprising the steps of:  
determining a current location of the pervasive device; and  
determining what data manipulation operations are available for the current location of the pervasive device.

15. The computer program product of claim 9, wherein the determining step further comprises determining what data manipulation operations are available responsive to a type of the pervasive device.

16. The computer program product of claim 9, further comprising the steps of:  
performing one or more data manipulation operations on the obtained data,  
thereby creating transformed data;  
determining what data manipulation operations are available for the transformed data; and  
providing references to the determined data manipulation operations for the transformed data to the pervasive device.

17. A system for enabling data access and manipulation from a pervasive device, comprising:  
a data manipulation server for maintaining a repository of data manipulation operations; and  
a protocol proxy in communication with the pervasive device and the data manipulation server and adapted to:  
receive a data access request from the pervasive device;

obtain the requested data;  
communicate with the data manipulation server to determine, responsive to the obtained data, what data manipulation operations are available; and  
provide references to the determined data manipulation operations to the pervasive device.

18. The system of claim 17, wherein the data manipulation server maintains a service invocation address for a data manipulation operation in the repository and wherein the reference to the determined data manipulation operation comprises the service invocation address.

19. The system of claim 17, wherein the data manipulation server is adapted to receive a request to perform a selected one of the determined data manipulation operations and invoke the requested operation on behalf of the pervasive device.

20. The system of claim 17, wherein the protocol proxy is further adapted to determine what data manipulation operations are available for a content type of the obtained data.

21. The system of claim 17, wherein the protocol proxy is further adapted to determine what data manipulation operations are available for a user of the pervasive device.

22. The system of claim 17, wherein the protocol proxy is further adapted to:  
determine a current location of the pervasive device; and  
determine what data manipulation operations are available responsive to the current location of the pervasive device.

23. The system of claim 17, wherein the protocol proxy is further adapted to determine what data manipulation operations are available responsive to a type of pervasive device.

24. The system of claim 17, wherein the protocol proxy is further adapted to:  
perform one or more data manipulation operations on the obtained data,  
thereby creating transformed data;  
determine what data manipulation operations are available for the transformed  
data; and  
provide references to the determined data manipulation operations for the  
transformed data to the pervasive device.



**TECHNIQUE FOR ENABLING REMOTE DATA ACCESS AND  
MANIPULATION FROM A PERVASIVE DEVICE**

**ABSTRACT OF THE DISCLOSURE**

Methods, systems, and computer program instructions for enabling users of pervasive devices to remotely access and manipulate information in ways that might otherwise be impossible or impractical because of inherent limitations of the device. The disclosed techniques enable a wide variety of data manipulation operations to be performed on behalf of the pervasive device, for a wide variety of content types. In preferred embodiments, no modifications or add-ons are required to the pervasive device.

FIG. 1

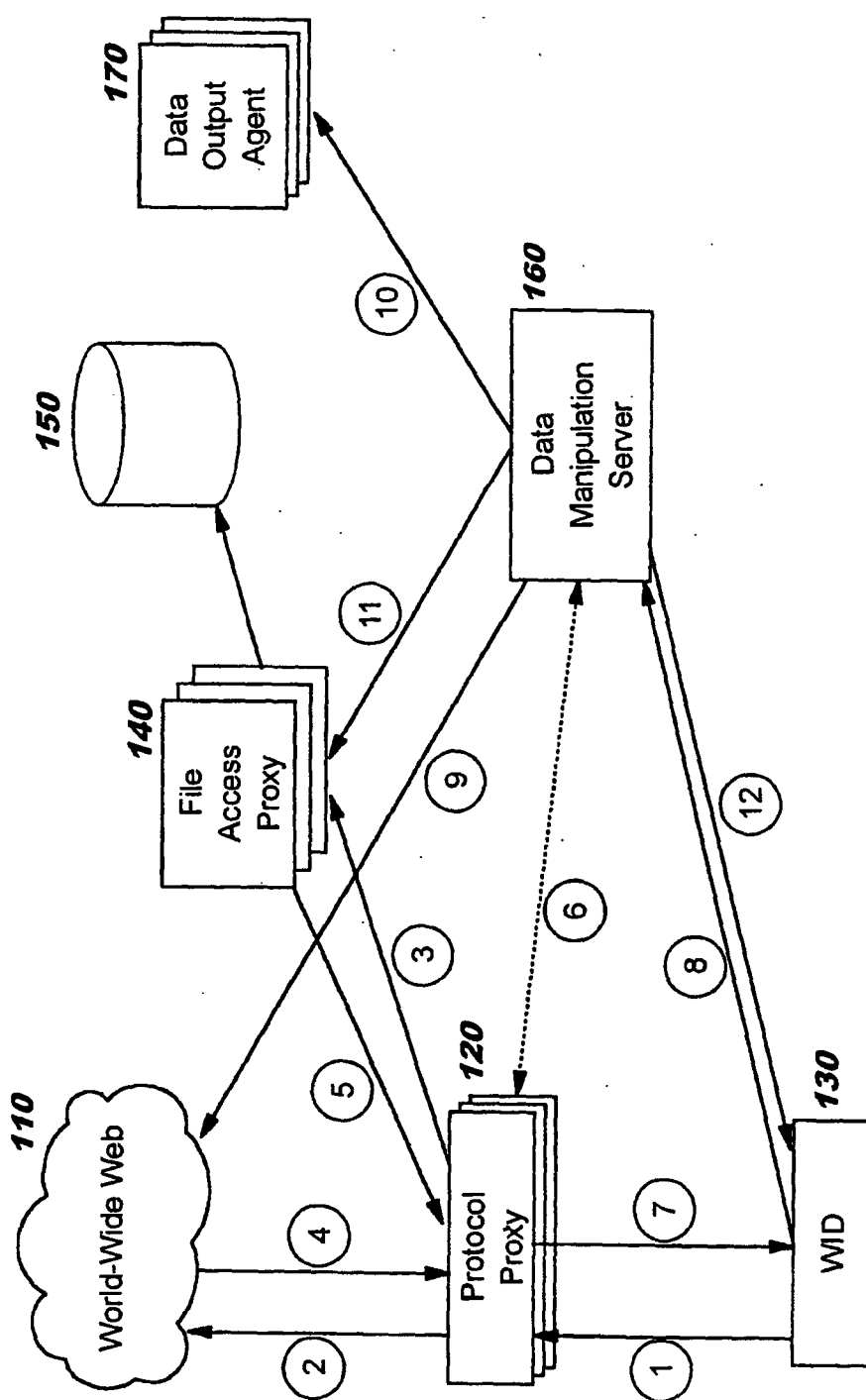


FIG. 2

	200	201	202
205	XML	convert to WBXML	DataManipulationServer/convert
210	XML	fax to recipient	DataManipulationServer/fax
215	ASCII	send as e-mail	DataManipulationServer/email

	250	251	252	253	254
255	*	A	*	print	DataManipulationServer/print
260	.doc	B	Conference Room C	print	DataManipulationServer/print

FIG. 3

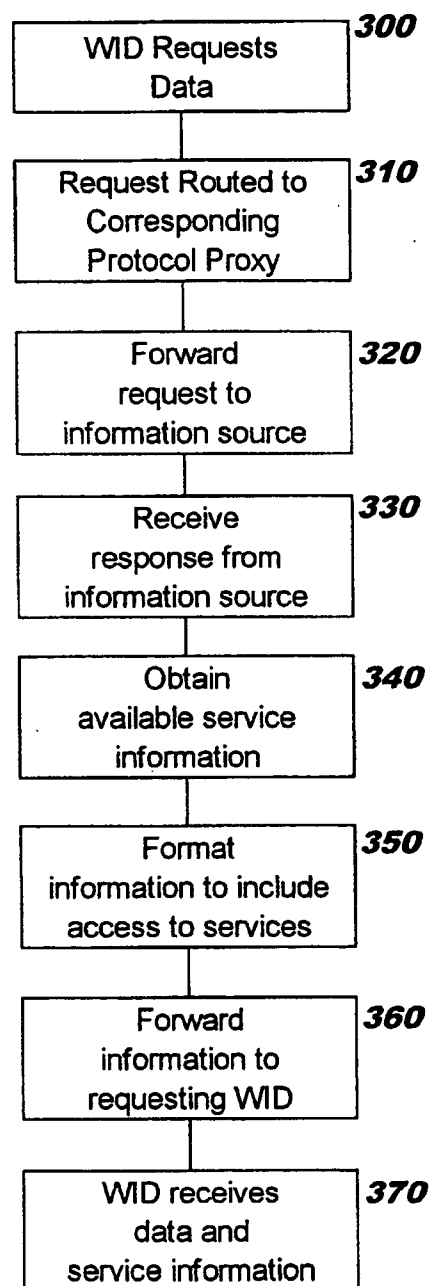


FIG. 4

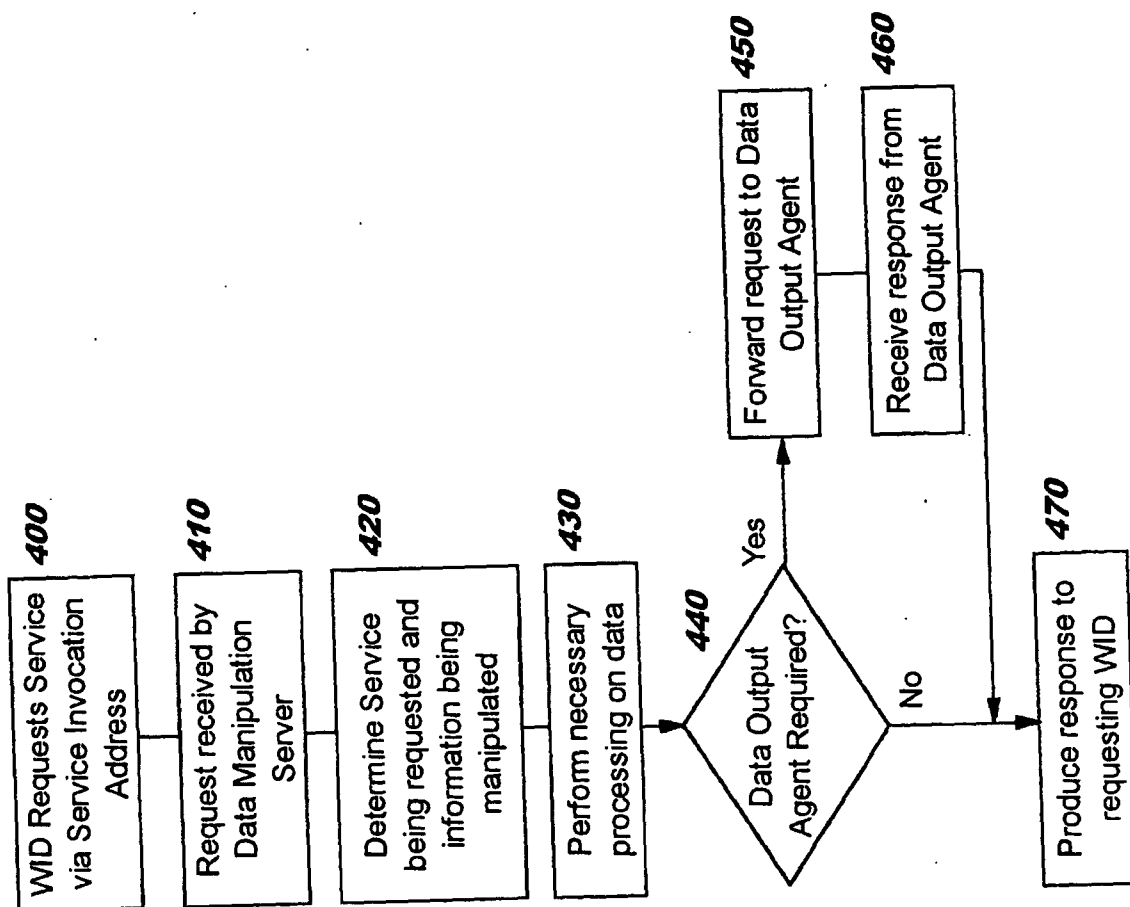


FIG. 5A

<http://DataManipulationServer/print>

FIG. 5B

[?url=http://www.reefedge.com](http://www.reefedge.com?url=http://www.reefedge.com)

FIG. 5C

<http://DataManipulationServer/print?url=http://www.reefedge.com>

FIG. 5D

<http://DataManipulationServer/print?file=fileServer/report.doc>

FIG. 5E

<http://DataManipulationServer/file?file=fileServer/report.doc&dest=newServer/filesAccessedByWID/report.doc>

FIG. 5F

[?cookie=acct\\_nbr.123456](#)

FIG. 5G

<http://DataManipulationServer/email>

FIG. 5H

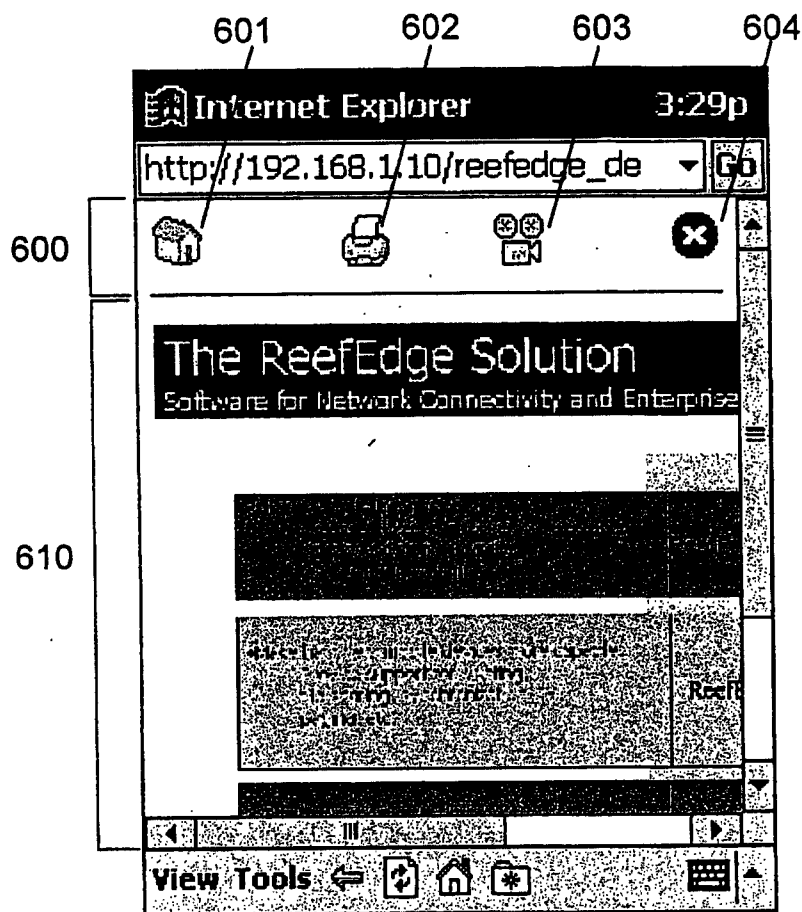
<http://DataManipulationServer/email?msg=//mailServer/msg98765.txt&dest=lucy@ricardo.com>

FIG. 5I

<http://DataManipulationServer/view?file=//fileServer/report.doc&template=segment>

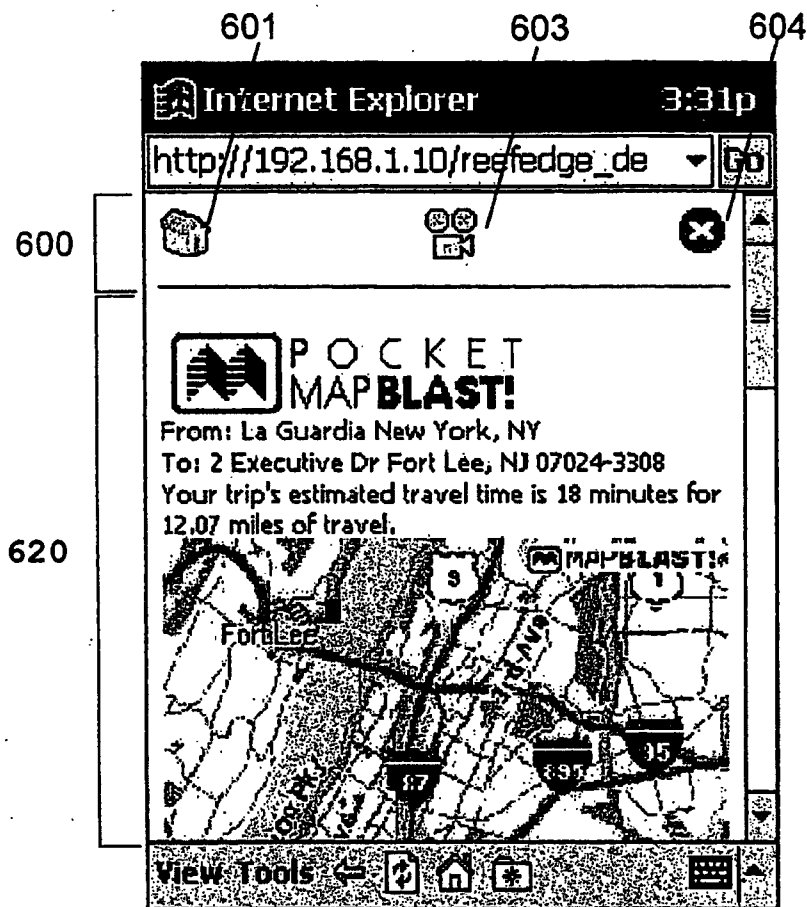


FIG. 6A



BEST AVAILABLE COPY

FIG. 6B



Attorney Docket Number MLDRE2001001  
First Named Inventor: S. Singhal  
Express Mail Label No. EF076589295US

**DECLARATION AND POWER OF ATTORNEY  
FOR UTILITY PATENT APPLICATION**

*Declaration Submitted with Initial Filing*

As a below named inventor, I hereby declare that:

My residence, post office address, and citizenship are as stated below next to my name.

I believe I am an original, first and joint inventor of the subject matter which is claimed and for which a patent is sought on the invention entitled:

TECHNIQUE FOR ENABLING REMOTE DATA ACCESS AND MANIPULATION FROM A MOBILE DEVICE
--

the specification of which is attached hereto.

I hereby state that I have reviewed and understand the contents of the above identified specification, including the claims.

I acknowledge the duty to disclose information which is material to patentability as defined in 37 CFR 1.56.

I hereby claim foreign priority benefits under 35 U.S.C. 119(a)-(d) or 365(b) of any foreign application(s) for patent or inventor's certificate, or 365(a) of any PCT international application which designated at least one country other than the United States of America, listed below and have also identified below, by checking the box, any foreign application for patent or inventor's certificate, or of any PCT international application having a filing date before that of the application on which priority is claimed.

Prior Foreign Application Number(s)	Country	Foreign Filing Date	Priority Not Claimed	Certified Copy
none				

---

I hereby claim the benefit under 35 U.S.C. 119(e) of any United States provisional application(s) listed below.

Application Number(s)	Filing Date
none	

---

I hereby claim the benefit under 35 U.S.C. 120 of any United States application(s), or 365(c) of any PCT international application designating the United States of America, listed below and, insofar as the subject matter of each of the claims of this application is not disclosed in the prior United States or PCT International application in the manner provided by the first paragraph of 35 U.S.C. 112, I acknowledge the duty to disclose information which is material to patentability as defined in 37 CFR 1.56 which became available between the filing date of the prior application and the national or PCT international filing date of this application.

U.S. Parent Application or PCT Parent Number	Parent Filing Date	Parent Patent Number
none		

---

As a named inventor, I hereby appoint the following registered practitioner(s) to prosecute this application and to transact all business in the Patent and Trademark Office connected therewith: Marcia L. Doubet, Registration Number 40,999.

---

Direct all correspondence to: Customer Number 000025260, having the correspondence address:

Name: Law Office of Marcia L. Doubet  
Address: 5228 Westminster Lane  
City: Fuquay-Varina  
State: NC  
Zip: 27526  
Country: USA  
Telephone: (919) 557-3827  
Fax: (919) 557-3827

I hereby declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under 18 U.S.C. 1001 and that such willful false statements may jeopardize the validity of the application or any patent issued thereon.

**Name of First Inventor:**

Given Name	Family Name or Surname
Sandeep Kishan	Singhal

Inventor's Signature:

*Sandeep K Singhal*

Date 5/2/01

Residence:

2 Leighton Street  
Englewood Cliffs, NJ 07632-1414  
USA

Citizenship:

US

Post Office Address:

same

**Name of Second Inventor:**

Given Name	Family Name or Surname
Barry Eliot	Levinson

Inventor's Signature:

*Barry Eliot*

Date 5/2/01

Residence:

206 East 22nd Street #3B  
New York, NY 10009  
USA

Citizenship:

US

Post Office Address:

same

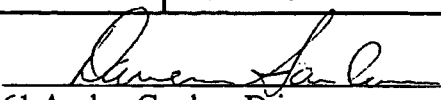
**Name of Third Inventor:**

Given Name

Family Name or Surname

Darren Michael	Sanders
----------------	---------

Inventor's Signature:



Date 5/2/01

Residence:

61 Avalon Gardens Drive  
Nanuet, NY 10954  
USA

Citizenship:

US

Post Office Address:

same

**POWER OF ATTORNEY TO PROSECUTE APPLICATIONS BEFORE THE USPTO**

I hereby appoint:

☒ Practitioners associated with the Customer Number

34415

**OR**

☐ Practitioner(s) named below (if more than ten patent practitioners are to be named, then a customer number must be used):

Name	Registration Number

as attorney(s) or agent(s) to represent the undersigned before the United States Patent and Trademark Office (USPTO) in connection with any and all patent applications assigned only to the undersigned according to the USPTO assignment records or assignment documents attached to this form in accordance with 37 CFR 3.73(b).


Assignee Name and Address:

Symantec Corporation  
20330 Stevens Creek Boulevard  
Cupertino, CA 95014

A copy of this form, together with a statement under 37 CFR 3.73(b) (Form PTO/SB/96 or equivalent) is required to be filed in each application in which this form is used. The statement under 37 CFR 3.73(b) may be completed by one of the practitioners appointed in this form if the appointed practitioner is authorized to act on behalf of the assignee, and must identify the application in which this Power of Attorney is to be filed.

**SIGNATURE of Assignee of Record**

The individual whose signature and title is supplied below is authorized to act on behalf of the assignee

Name	Michael Schallop		
Signature		Date	7.20.04.AT
Title	Corporate Counsel, Symantec Corporation	Telephone	(408) 517-8297

**STATEMENT UNDER 37 CFR 3.73(b)**

Applicant/Patent Owner: Symantec Corporation

Application No./Patent No.: Unassigned

Filed/Issue Date: March 7, 2005

Entitled: Technique for Enabling Remote Data Access and Manipulation From a Pervasive Device

Symantec Corporation, a  
(Name of Assignee)

Corporation  
(Type of Assignee, e.g., corporation, partnership, university, government agency, etc.)

states that it is:

1. ☒ the assignee of the entire right, title, and interest; or  
2. ☐ an assignee of less than the entire right, title and interest.  
The extent (by percentage) of its ownership interest is \_\_\_\_\_ %  
in the patent application/patent identified above by virtue of either:

- A. ☐ An assignment from the inventor(s) of the patent application/patent identified above. The assignment was recorded in the United States Patent and Trademark Office at Reel \_\_\_\_\_, Frame \_\_\_\_\_, or for which a copy thereof is attached.

OR

- B. ☒ A chain of title from the inventor(s), of the patent application/patent identified above, to the current assignee as shown below:

1. From Sandeep K. Singhal, Barry E. Levinson and Darren M. Sanders To: ReefEdge, Inc.  
The document was recorded in the United States Patent and Trademark Office at  
Reel 014378, Frame 0225, or for which a copy thereof is attached.
2. From ReefEdge, Inc. To: Symantec Corporation and Symantec International Limited  
The document was recorded in the United States Patent and Trademark Office at  
Reel 015698, Frame 0943, or for which a copy thereof is attached.
3. From Symantec International Limited To: Symantec Corporation  
The document was recorded in the United States Patent and Trademark Office at  
Reel 015722, Frame 0797, or for which a copy thereof is attached.

☐ Additional documents in the chain of title are listed on a supplemental sheet.

- [X] Copies of assignments or other documents in the chain of title are attached.  
[NOTE: A separate copy (i.e., a true copy of the original document) must be submitted to Assignment Division in accordance with 37 CFR Part 3, if the assignment is to be recorded in the records of the USPTO. See MPEP 302.08]

The undersigned (whose title is supplied below) is authorized to act on behalf of the assignee.

3/7/05  
Date

(415) 875-2484  
Telephone number

Brian M. Hoffman  
Typed or printed name

[Signature]  
Signature

Attorney for Assignee  
Title



NOT FOR RECORDATION

Attorney Docket Number MLDRE2001001  
Express Mail Label No. EF076589295US

**ASSIGNMENT OF PATENT APPLICATION**

WHEREAS, we, the undersigned Sandeep Kishan Singhal, Barry Eliot Levinson, and Darren Michael Sanders, whose full postal addresses are given below, hereafter referred to as Applicants, have invented certain new and useful improvements disclosed in an application for United States Letters Patent titled **TECHNIQUE FOR ENABLING REMOTE DATA ACCESS AND MANIPULATION FROM A MOBILE DEVICE**, executed on even date herewith, and

WHEREAS, ReefEdge, Inc., a corporation whose full postal address is 2 Executive Drive, Suite 600, Fort Lee, New Jersey, United States of America, herein (together with any successors, legal representatives, and/or assignees thereof) referred to as Assignee, is desirous of acquiring the entire right, title and interest in the same;

NOW, THEREFORE, in exchange for good and valuable consideration, the receipt and sufficiency of which is hereby acknowledged, we, the Applicants, by these presents do sell, assign and transfer unto said Assignee the full and exclusive right, title, and interest in and to the said improvements and said application (and all divisions, substitutions, continuations, and continuations-in-part thereof) in the United States and the entire right, title and interest in and to any and all Patents (including all re-issues, renewals, and extensions thereof) which may be granted therefor in the United States; and we hereby authorize and request the United States Commissioner of Patents and Trademarks to issue all said Patents to said Assignee, of the entire right, title, and interest in and to the same, for Assignee's sole use and behoof, and for the use and behoof of Assignee's legal representatives, to the full end of the term for which said Patents may be granted, as fully and entirely as the same would have been held by us had this assignment and sale not been made;

AND we hereby covenant that we have full right to convey the entire interest herein assigned, and that we have not executed, and will not execute, any agreement in conflict herewith;

AND we hereby further covenant and agree that we will communicate to Assignee any facts known to us respecting said improvements, and testify in any legal proceeding, sign all lawful papers, execute all divisional, substitute, continuation, continuation-in-part and re-issue applications, make all rightful oaths and generally do everything possible to aid Assignee to obtain and enforce proper patent protection for said improvements.

Executed this 2 day of May, 2001, at FORT LEE, NJ.

Signatures of Sandeep Kishan Singhal, Barry Eliot Levinson, and Darren Michael Sanders, along with full postal addresses thereof, follow:

NOT FOR RECORDATION

By Sandeep Kishan Singhal, whose full postal address is 2 Leighton Street, Englewood Cliffs, NJ, 07632-1414;

Sandeep K Singhal  
(Signature of Sandeep Kishan Singhal)

By Barry Eliot Levinson, whose full postal address is 206 <sup>1837 Ave B</sup> East 22nd Street #3B, New York, NY, 10009;

[Signature]  
(Signature of Barry Eliot Levinson)

and By Darren Michael Sanders, whose full postal address is 61 Avalon Gardens Drive, Nanuet, NY, 10954.

[Signature]  
(Signature of Darren Michael Sanders)

State of New Jersey ) SS.  
County of Bergen )

On this 2 day of May, 2001, before the undersigned, a Notary Public for the State and County aforesaid, personally appeared said Sandeep Kishan Singhal, Barry Eliot Levinson, and Darren Michael Sanders, who are known or proved to me on the basis of satisfactory evidence to be the persons whose names are subscribed to the above assignment, and acknowledged that they executed the same.

Seal

[Signature]  
(Notary Public)

My commission expires: 8/31/01

NOT FOR RECORDATION

PATENT ASSIGNMENT

This PATENT ASSIGNMENT (this "Assignment") is entered into by ReefEdge, Inc., Delaware corporation, having a place of business located at Two Executive Drive, Suite 600, Fort Lee, New Jersey 07024 ("Assignor"), as assignor, in favor of Symantec Corporation, a Delaware corporation, having a place of business located at 20330 Stevens Creek Blvd, Cupertino, CA 95014 and Symantec International Limited, an Irish company with its corporate offices at Ballycoolin Business Park, Blanchardstown, Dublin 15, Ireland (collectively "Assignee"), as assignee, with reference to the following facts and circumstances:

Assignor and Assignee have entered into that certain Asset Purchase Agreement dated as of January 31, 2005 (the "Asset Purchase Agreement"), which, along with the promises contained herein, constitute mutual consideration for the promises herein;

Assignor is the sole and exclusive owner of the Letters Patents and applications in the United States (hereinafter the "Patents") as shown on the attached Exhibit 1.

Assignee desires to acquire, and Assignor desires to assign, Assignor's right, title and interest in, to and under the Patents as provided in the Asset Purchase Agreement.

NOW, THEREFORE, to all whom it may concern, be it known that for good and valuable consideration the receipt and adequacy of which is hereby acknowledged, Assignor has sold, assigned, transferred and set over, and does hereby sell, assign, transfer and set over to Assignee the Patents listed in Exhibit 1 attached hereto, together with all patents, patent applications, patent rights (including all reissues, reexaminations, extensions, continuations, continuations in part, continuing prosecution applications, and divisions of such patents and applications; provisional patent applications that are or will be continuations or continuations in part of such patents and applications foreign counterparts to any of the foregoing including utility models; and the right to sue and recover for past infringement).

Assignor further warrants that it has not executed, and will not execute, any agreements in conflict with or inconsistent with this assignment.

In testimony whereof, Assignor has caused this Assignment to be executed by its officer(s) thereunto duly authorized.

ASSIGNOR  
ReefEdge, Inc.

David Guretski,  
Chief Executive Officer

Dated: 01/28/05

NOT FOR RECORDATION

EXHIBIT 1 TO PATENT ASSIGNMENT

UNITED STATES ISSUED PATENTS

Serial No.	Filing Date	Title
6,633,761 (09/637,742)	Aug. 11, 2000	Enabling Seamless User Mobility in a Short-Range Wireless Networking Environment
6,691,227 (09/657,745)	September 10, 2000	Location Independent Packet Routing and Secure Access in a Short-Range Wireless Networking Environment

UNITED STATES PENDING PATENT APPLICATIONS

Serial No.	Filing Date	Title
09/866,297 (divisional of 09/657,745)	May 21, 2001	Providing Secure Network Access for short-range wireless computing devices
10/688,576 (continuation of 09/657,745)	October 20, 2003	Location Independent Packet Routing and Secure Access in a Short-Range Wireless Networking Environment
09/685,715	October 10, 2000	Extension Mechanism and Technique for Enabling Low-Power End Devices To Access Remote Networks using Short-Range Wireless Communications means
10/785,637 (divisional of 09/685,715)	February 24 2004	Mechanism and Technique for Dynamically Optimizing Antenna Orientation and Transmit Power in a Meshed Network Environment
09/848,662	May 3, 2001	Method and System for Adapting Short-Range Wireless Access Points for Participation in a Coordinated Networked Environment

NOT FOR RECORDATION

09/848,441	May 3, 2001	Location Aware Service Proxies in a Short-Range Wireless Environment
09/848,394	May 3, 2001	Technique for Enabling Remote Data Access and Manipulation from a Pervasive Device
10/011,538	Nov. 13, 2001	Enabling Secure Communication in a Clustered or Distributed Architecture
10/457,573 (divisional of 09/637,742)	June 11, 2003	Seamless User Mobility in a Short-Range Wireless Networking Environment

NOT FOR RECORDATION

**ASSIGNMENT**

For good and valuable consideration, the receipt of which is hereby acknowledged, Symantec International Limited, an Irish company, having a place of business at Ballycoolin Business Park, Blanchardstown, Dublin 15, Ireland ("ASSIGNOR"), has sold, assigned, and transferred and does hereby sell, assign, and transfer to Symantec Corporation, a Delaware corporation, having a place of business at 20330 Stevens Creek Blvd., Cupertino, CA 95014 ("ASSIGNEE"), for itself and its successors, transferees, and assignees, the following:

1. The entire worldwide right, title, and interest in all inventions and improvements ("SUBJECT MATTER") that are disclosed in the following applications and Letters Patents ("PATENT RIGHTS"):

Country:	Patent Application Serial No.:	Title:	Filing Date:
US	09/866,297	Providing Secure Network Access for Short-Range Wireless Computing Devices	May 21, 2001
US	10/688,576	Location Independent Packet Routing and Secure Access in a Short-Range Wireless Networking Environment	October 20, 2003
US	09/685,715	Extension Mechanism and Technique for Enabling Low-Power End Devices to Access Remote Networks Using Short-Range Wireless Communications Means	October 10, 2000
US	10/785,637	Mechanism and Technique for Dynamically Optimizing Antenna Orientation and Transmit Power in a Meshed Network Environment	February 24, 2004
US	09/848,662	Method and System for Adapting Short-Range Wireless Access Points for Participation in a Coordinated Networked Environment	May 3, 2001
US	09/848,441	Location Aware Service Proxies in a Short-Range Wireless Environment	May 3, 2001
US	09/848,394	Technique for Enabling Remote Data Access and Manipulation From a Pervasive Device	May 3, 2001
US	10/011,538	Enabling Secure Communication in a Clustered or Distributed Architecture	November 13, 2001
US	10/457,573	Seamless User Mobility in a Short-Range Wireless Networking Environment	June 11, 2003

Country:	Letters Patent No.:	Title:	Issue Date:
US	6,633,761	Enabling Seamless User Mobility in a Short-Range Wireless Networking Environment	October 14, 2003
US	6,691,227	Location Independent Packet Routing and Secure Access in a Short-Range Wireless Networking Environment	February 10, 2004

and;

NOT FOR RECORDATION

2. The entire worldwide right, title, and interest in and to:

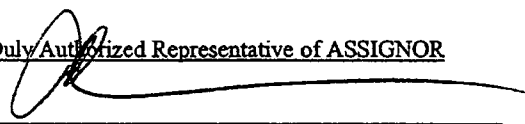
(a) the PATENT RIGHTS, including any right of priority; (b) any provisional, divisional, continuation, substitute, renewal, reissue, and other related applications thereto which have been or may be filed in the United States or elsewhere in the world; (c) any patents which may be granted on the applications set forth in (a) and (b) above; and (d) the right to sue in its own name and to recover for past infringement of any or all of any applications or patents issuing therefrom together with all rights to recover damages for infringement of provisional rights.

ASSIGNOR agrees to do the following, when requested, and without further consideration, in order to carry out the intent of this Assignment: (1) execute all oaths, assignments, powers of attorney, applications, and other papers necessary or desirable to fully secure to ASSIGNEE the rights, titles and interests herein conveyed; (2) communicate to ASSIGNEE all known facts relating to the SUBJECT MATTER of the above-identified patent applications and Letters Patents; and (3) generally do all lawful acts that ASSIGNEE shall consider desirable for securing, maintaining, and enforcing worldwide patent protection relating to the SUBJECT MATTER of the above-identified patent applications and Letters Patents and for vesting in ASSIGNEE the rights, titles, and interests herein conveyed. ASSIGNOR further agrees to provide any successor, transferee, assignee, or legal representative of ASSIGNEE with the benefits and assistance provided to ASSIGNEE hereunder.

ASSIGNOR represents that ASSIGNOR has the rights, titles, and interests to convey as set forth herein, and covenants with ASSIGNEE that the ASSIGNOR has made or will make hereafter no assignment, grant, mortgage, license, or other agreement affecting the rights, titles, and interests herein conveyed.

Duly Authorized Representative of ASSIGNOR

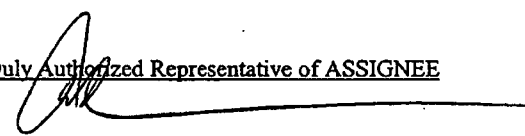
Date of Signature

  
Arthur Courville  
Director  
Symantec International Limited  
Ballycoolin Business Park  
Blanchardstown, Dublin 15  
IRELAND

2/15/05, 2005

Duly Authorized Representative of ASSIGNEE

Date of Signature

  
Arthur Courville  
Senior Vice President and General Counsel  
Symantec Corporation  
20330 Stevens Creek Blvd  
Cupertino, CA 95014

2/15/05, 2005

NOT FOR RECORDATION

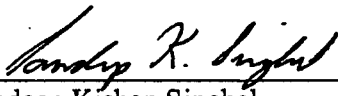
AMENDMENT TO ASSIGNMENT

We the undersigned inventors hereby amend the Assignment of Patent  
Application, executed on May 2, 2001, assigning U.S. Patent Application No. 09/848,394  
to ReefEdge, Inc., to fix a typographical error as follows:

In the first "WHEREAS" clause,


"United States Letters Patent titled TECHNIQUE FOR ENABLING REMOTE  
DATA ACCESS AND MANIPULATION FROM A MOBILE DEVICE" should read  
"United States Letters Patent titled TECHNIQUE FOR ENABLING REMOTE DATA  
ACCESS AND MANIPULATION FROM A PERVASIVE DEVICE".

By Sandeep Kishan Singhal, whose full postal address is 2 Leighton Street, Englewood  
Cliffs, NJ 07632-1414

  
Sandeep Kishan Singhal

20 JULY 2003  
Date

By Barry Eliot Levinson, whose full postal address is 206 First Ave #3B, New  
York, NY 10009

  
Barry Eliot Levinson

21 July 2003  
Date

By Darren Michael Sanders whose full postal address is 61 Avalon Gardens Drive,  
Nanuet, NY 10954

  
Darren Michael Sanders

21 July 2003  
Date





## UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE  
 United States Patent and Trademark Office  
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 Alexandria, Virginia 22313-1450  
 www.uspto.gov

APPLICATION NUMBER	FILING OR 371 (c) DATE	FIRST NAMED APPLICANT	ATTORNEY DOCKET NUMBER
11/075,437	03/07/2005	Sandeep Kishan Singhal	20423-10036

CONFIRMATION NO. 5116

34415  
 FENWICK & WEST LLP  
 SILICON VALLEY CENTER  
 801 CALIFORNIA STREET  
 MOUNTAIN VIEW, CA 94041

## FORMALITIES LETTER



\*OC000000015709381\*

Date Mailed: 04/11/2005

## NOTICE TO FILE CORRECTED APPLICATION PAPERS

*Filing Date Granted*

An application number and filing date have been accorded to this application. The application is informal since it does not comply with the regulations for the reason(s) indicated below. Applicant is given TWO MONTHS from the date of this Notice within which to correct the informalities indicated below. Extensions of time may be obtained by filing a petition accompanied by the extension fee under the provisions of 37 CFR 1.136(a).

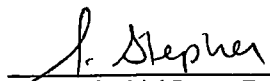
The required item(s) identified below must be timely submitted to avoid abandonment:

- Replacement drawings in compliance with 37 CFR 1.84 and 37 CFR 1.121(d) are required. The drawings submitted are not acceptable because:
  - More than one figure is present and each figure is not labeled "Fig." with a consecutive Arabic numeral (1, 2, etc.) or an Arabic numeral and capital letter in the English alphabet (A, B, etc.)(see 37 CFR 1.84(u)(1)). See Figure(s) 2. A brief description of the several views of the drawings (see 37 CFR 1.74) should be added or amended to correspond to the corrected numbering of the figures. See also 37 CFR 1.77(b)(7).

Applicant is cautioned that correction of the above items may cause the specification and drawings page count to exceed 100 pages. If the specification and drawings exceed 100 pages, applicant will need to submit the required application size fee.

Replies should be mailed to: Mail Stop Missing Parts  
 Commissioner for Patents  
 P.O. Box 1450  
 Alexandria VA 22313-1450

*A copy of this notice **MUST** be returned with the reply.*



Office of Initial Patent Examination (703) 308-1202

PART 3 - OFFICE COPY





IN THE UNITED STATES

**PATENT AND TRADEMARK OFFICE**

APPLICANTS: Sandeep K. Singhal et al.  
APPLICATION NO.: 11/075,437  
FILING DATE: March 7, 2005  
TITLE: TECHNIQUE FOR ENABLING REMOTE DATA ACCESS AND  
MANIPULATION FROM A PERVASIVE DEVICE  
EXAMINER: Not yet known  
GROUP ART UNIT: 2161  
ATTY. DKT. NO.: 20423-10036

**CERTIFICATE OF MAILING**

I hereby certify that this correspondence is being deposited with the United States Postal Service as first class mail in an envelope addressed to: Mail Stop Missing Parts, Commissioner For Patents, P.O. Box 1450, Alexandria, VA 22313-1450, on the date shown below:

Dated: 6/6/05

By: [Signature]  
Brian M. Hoffman, Reg. No.: 39,713

MAIL STOP MISSING PARTS  
COMMISSIONER FOR PATENTS  
P.O. BOX 1450  
ALEXANDRIA, VA 22313-1450

**RESPONSE TO THE NOTICE TO FILE CORRECTED APPLICATION PAPERS**

SIR:

Responsive to the Notice To File Corrected Application Papers dated April 11, 2005  
received in the above-identified patent application,

☒ Enclosed are:

☒ a copy of the Notice To File Corrected Application Papers; and

PATENT


☒ Other: Replacement Drawing in compliance with 37 CFR 1.84 and 37 CFR 1.121(d).

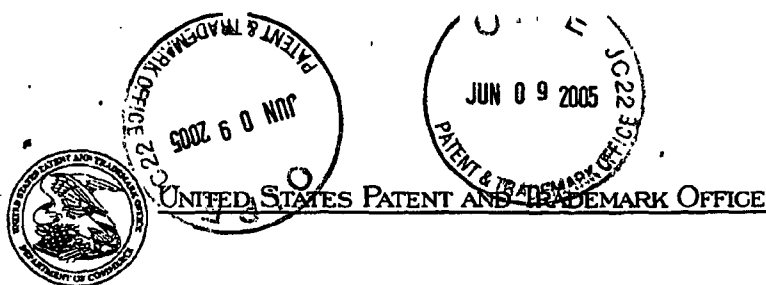
REMARKS

Enclosed is a replacement page containing Figures 2A and 2B in compliance with 37 CFR 1.84 and 1.121(d). Applicants submit that amending the specification is unnecessary because it already refers to Figs. 2A and 2B.

Respectfully submitted,  
SANDEEP K. SINGHAL ET AL.

Dated: 6/6/05

By:   
Brian M. Hoffman, Reg. No.: 39,713  
Fenwick & West LLP  
Silicon Valley Center  
801 California Street  
Mountain View, CA 94041  
Tel.: (510) 875-2484  
Fax.: (415) 281-1350



Page 1 of 2

IFW

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www.uspto.gov

APPLICATION NUMBER	FILING OR 371 (c) DATE	FIRST NAMED APPLICANT	ATTORNEY DOCKET NUMBER
11/075,437	03/07/2005	Sandeep Kishan Singhal	20423-10036

CONFIRMATION NO. 5116

34415  
FENWICK & WEST LLP  
SILICON VALLEY CENTER  
801 CALIFORNIA STREET  
MOUNTAIN VIEW, CA 94041

**Fenwick & West**

APR 13 2005

**Received**

FORMALITIES LETTER



\*OC000000015709381\*

Date Mailed: 04/11/2005

## NOTICE TO FILE CORRECTED APPLICATION PAPERS

### *Filing Date Granted*

An application number and filing date have been accorded to this application. The application is informal since it does not comply with the regulations for the reason(s) indicated below. Applicant is given TWO MONTHS from the date of this Notice within which to correct the informalities indicated below. Extensions of time may be obtained by filing a petition accompanied by the extension fee under the provisions of 37 CFR 1.136(a).

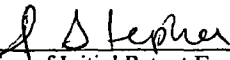
The required item(s) identified below must be timely submitted to avoid abandonment:

- Replacement drawings in compliance with 37 CFR 1.84 and 37 CFR 1.121(d) are required. The drawings submitted are not acceptable because:
  - More than one figure is present and each figure is not labeled "Fig." with a consecutive Arabic numeral (1, 2, etc.) or an Arabic numeral and capital letter in the English alphabet (A, B, etc.)(see 37 CFR 1.84(u)(1)). See Figure(s) 2. A brief description of the several views of the drawings (see 37 CFR 1.74) should be added or amended to correspond to the corrected numbering of the figures. See also 37 CFR 1.77(b)(7).

Applicant is cautioned that correction of the above items may cause the specification and drawings page count to exceed 100 pages. If the specification and drawings exceed 100 pages, applicant will need to submit the required application size fee.

Replies should be mailed to: Mail Stop Missing Parts  
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P.O. Box 1450  
Alexandria VA 22313-1450

*A copy of this notice **MUST** be returned with the reply.*

  
Office of Initial Patent Examination (703) 308-1202

PART 1 - ATTORNEY/APPLICANT COPY



FIG. 2A

	200	201	202
205	XML	convert to WBXML fax to recipient. send as e-mail	DataManipulationServer/convert
210	XML		DataManipulationServer/fax
215	ASCII		DataManipulationServer/email

FIG. 2B

	250	251	252	253	254
255	*	A	*	print	DataManipulationServer/print
260	.doc	B	Conference Room C	print	DataManipulationServer/print





1PW  
+

<b>TRANSMITTAL FORM</b> <i>(to be used for all correspondence during pendency of filed application)</i>	Application Number	11/075,437	
	Filing Date	March 7, 2005	
	First Named Inventor	Sandeep Kishan Singhal	
	Group Art Unit Number	2161	
	Examiner Name	Not Yet Known	
Total Number of Pages in This Submission	5	Attorney Docket Number	20423-10036

<b>ENCLOSURES (check all that apply)</b>	
<input type="checkbox"/> Fee Transmittal Form (in duplicate) <input type="checkbox"/> Check Enclosed <input checked="" type="checkbox"/> Return Receipt Postcard <input type="checkbox"/> Response to Notice to File Missing Parts <input type="checkbox"/> Assignment & Recordation Cover Sheet <input type="checkbox"/> Declaration <input type="checkbox"/> Power of Attorney <input type="checkbox"/> Application Data Sheet <input checked="" type="checkbox"/> Information Disclosure Statement & PTO/SB/08A <input type="checkbox"/> Copies of IDS Cited References <input type="checkbox"/> Request for Corrected Filing Receipt <input type="checkbox"/> Request for Correction of Recorded Assignment <input type="checkbox"/> Amendment/Response: [ ] Page(s) <input type="checkbox"/> After Final <input type="checkbox"/> Status Request <input type="checkbox"/> Revocation and Substitute Power of Attorney	<input type="checkbox"/> Issue Fee Transmittal <input type="checkbox"/> Letter to Chief Draftsperson <input type="checkbox"/> Formal Drawing(s): [ ] Sheet(s) of Figure(s) [ ] <input type="checkbox"/> Appeal Communication to Board of Appeals and Interferences <input type="checkbox"/> Appeal Communication to Group (Appeal Notice, Brief, Reply Brief) <input type="checkbox"/> Certified Copy of Priority Document(s) <input type="checkbox"/> After Allowance Communication to Group <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>
REMARKS:	

<b>SIGNATURE OF ATTORNEY OR AGENT</b>			
Signature:			
Attorney/Reg. No.:	Brian M. Hoffman, Reg. No. 39,713	Dated:	7/29/05

<b>CERTIFICATE OF MAILING</b>			
I hereby certify that this correspondence, including the enclosures identified above, is being deposited with the United States Postal Service as first class mail in an envelope addressed to: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450 on the date shown below. If the Express Mail Mailing Number is filled in below, then this correspondence is being deposited with the United States Postal Service "Express Mail Post Office to Addressee" service pursuant to 37 CFR 1.10.			
Signature:			
Typed or Printed Name:	Brian M. Hoffman	Dated:	9/29/05
Express Mail Mailing Number (optional):			



IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

APPLICANT: Sandeep Kishan Singhal, Barry Eliot Levinson and Darren Michael Sanders  
APPLICATION NO.: 11/075,437  
FILING DATE: March 7, 2005  
TITLE: Technique For Enabling Remote Data Access And Manipulation From A Pervasive Device  
EXAMINER: Not Yet Known  
GROUP ART UNIT: 2161  
ATTY. DKT. NO.: 20423-10036

CERTIFICATE OF MAILING

I hereby certify that this correspondence is being deposited with the United States Postal Service as first class mail in an envelope addressed to: Mail Stop Amendment, Commissioner For Patents, P.O. Box 1450, Alexandria, VA 22313-1450, on the date shown below:

Dated: 9/29/05

By: [Signature]  
Brian M. Hoffman, Reg. No.: 39,713

MAIL STOP AMENDMENT  
COMMISSIONER FOR PATENTS  
P.O. BOX 1450  
ALEXANDRIA, VA 22313-1450

INFORMATION DISCLOSURE STATEMENT

Under 37 CFR §§ 1.56 and 1.97-98

SIR:

Pursuant to the provisions of 37 CFR §§ 1.56 and 1.97-98, enclosed herewith is modified form PTO/SB/08A listing references for consideration by the Examiner.

The filing of this Information Disclosure Statement shall not be construed as a representation regarding the completeness of the list of references, or that inclusion of a reference in this list is an admission that it is prior art or is pertinent to this application, or that a search has been made, or as an admission that the information listed is, or may be considered to be, material to patentability, or that no other material information exists, and shall not be construed as an admission against interest in any manner.

This Information Disclosure Statement is being filed:

- ☒ within three months of the filing date of the application, or date of entry into the national stage of an international application, or before the mailing date of a first office action on the merits, whichever event last occurred;
- ☐ before the mailing of a first official action after the filing of a request for continued examination (RCE) under 37 CFR § 1.114;
- ☐ after three months of the filing date of this national application or the date of entry of the national stage in an international application, or after the mailing

**PATENT**

date of the first official action on the merits, whichever event last occurred, but before the mailing date of the first to occur of either: (1) a final action under 37 CFR §1.113; or (2) an action that otherwise closes prosecution in the application, and:

- ☐ attached hereto is the fee set forth under 37 CFR §1.17(p) for submission of this Information Disclosure Statement under 37 CFR. § 1.97(c); OR
- ☐ Applicant certifies pursuant to 37 CFR § 1.97(e) that:
  - ☐ each item of information contained in this Information Disclosure Statement was first cited in a communication from a foreign patent office in a counterpart foreign application not more than three months prior to the filing of this Statement; OR
  - ☐ no item of information contained in this Information Disclosure Statement was cited in a communication from a foreign patent office in a counterpart foreign application and, to the knowledge of the person signing this certification after making reasonable inquiry, no item of information contained in this Statement was known to any individual designated under 37 CFR § 1.56(c) more than three months prior to the filing of this Statement;
- ☐ on or before the payment of the issue fee but after the mailing date of the first to occur of either: (1) a final action under 37 CFR § 1.113; (2) a notice of allowance under 37 CFR § 1.311; or (3) an action that otherwise closes prosecution in the application, and:
  - ☐ Applicant certifies pursuant to 37 CFR. § 1.97(e) that:
    - ☐ each item of information contained in this Information Disclosure Statement was cited in a communication from a foreign patent office in a counterpart foreign application not more than three months prior to the filing of this Statement;
    - ☐ no item of information contained in this Information Disclosure Statement was cited in a communication from a foreign patent office in a counterpart foreign application and, to the knowledge of the person signing this certification after making reasonable inquiry, no item of information contained in this Statement was known to any individual designated

**PATENT**


under 37 CFR § 1.56(c) more than three months prior to the filing of this Statement; AND

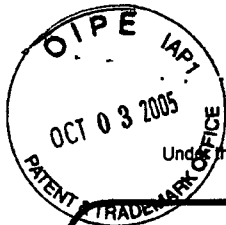
- ☐ attached hereto is the fee set forth under 37 CFR §1.17(p) for submission of this Information Disclosure Statement under 37 CFR § 1.97(d); OR
- ☐ after the payment of the issue fee. Applicant requests that the information contained in this Information Disclosure Statement be placed in the file according to 37 CFR § 1.97(i), although the information may not be considered by the USPTO.
- ☐ Enclosed is a copy of each listed reference that may be material to the examination of this application, and for which there may be a duty to disclose.
- ☒ This application relies, under 35 U.S.C. § 120, on the earlier filing date of prior application No. 09/848,394, filed on May 3, 2001, and the references cited therein are hereby referenced, but are not required to be provided in this application under 37 CFR § 1.98(d).
- ☐ This application was filed after June 30, 2003. Therefore, pursuant to the waiver of the requirements under 37 CFR 1.98(a)(2)(i), copies of each U.S. Patent and each U.S. Patent Application Publication are not required to be submitted. Copies of any foreign patent documents and non-patent literature cited herein are enclosed.
- ☐ Each item of information contained in this Information Disclosure Statement was cited in a communication from a foreign patent office in a counterpart application, and the communication was not received by any individual designated in 37 CFR § 1.56(c) more than thirty days prior to the filing of this Information Disclosure Statement. 37 CFR § 1.704(d).
- ☒ Applicant submits that no fee is required for the consideration of this Information Disclosure Statement.

Consideration of the listed references and favorable action are solicited.

Respectfully submitted,  
SANDEEP KISHAN SINGHAL ET AL.

Dated: 9/29/05

By:   
Brian M. Hoffman, Reg. No.: 39,713  
Fenwick & West LLP  
Silicon Valley Center  
801 California Street  
Mountain View, CA 94041  
Tel.: (415) 875-2484  
Fax.: (650) 938-5200



Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it contains a valid OMB control number.

<b>Substitute for form 1449A/PTO</b>  <b>INFORMATION DISCLOSURE STATEMENT BY APPLICANT</b>				<b>Complete if Known</b>	
				Application No.	11/075,437
				Filing Date	March 7, 2005
				First Named Inventor	Sandeep K. Singhal
				Art Unit	2161
				Examiner Name	Not Yet Known
Sheet	1	of	1	Attorney Docket Number	20423-10036

U.S. PATENT DOCUMENTS				
Examiner Initials*	Cite No. <sup>1</sup>	Document No. Number – Kind Code <sup>2</sup> (if known)	Date MM-DD-YYYY	Name of Patentee or Applicant of Cited Document
	A1	US-6,816,719	11-09-2004	Heinonen et al.
	A2	US-6,765,596	07-20-2004	Lection et al.
		US-		
		US-		
		US-		
		US-		
		US-		
		US-		

FOREIGN PATENT DOCUMENTS					
Examiner Initials*	Cite No. <sup>1</sup>	Foreign Patent Document Country Code <sup>3</sup> – Number <sup>4</sup> Kind Code <sup>5</sup> (if known)	Publication Date MM-DD-YYYY	Name of Patentee or Applicant of Cited Document	T <sup>6</sup>

OTHER REFERENCES – NON-PATENT LITERATURE DOCUMENTS				
Examiner Initials*	Cite No. <sup>1</sup>	Include name of the author (in CAPITAL LETTERS), title of the article (when appropriate), title of the item (book, magazine, journal, serial, symposium, catalog, etc.), date, page(s), volume-issue number(s), publisher, city and/or country where published	T <sup>6</sup>	

Examiner Signature		Date Considered	
--------------------	--	-----------------	--

\*EXAMINER: Initial if reference considered, whether or not citation is in conformance with MPEP 609.  
Draw line through citation if not in conformance and not considered. Include copy of this form with next communication to applicant.

<sup>1</sup>Applicant's unique citation designation number (optional). <sup>2</sup>See Kinds Codes of USPTO Patent Documents at [www.uspto.gov](http://www.uspto.gov) or MPEP 901.04. <sup>3</sup>Enter Office that issued the document, by the two-letter code (WIPO Standard ST.3). <sup>4</sup>For Japanese patent documents, the indication of the year of the reign of the Emperor must precede the serial number of the patent document. <sup>5</sup>Kind of document by the appropriate symbols as indicated on the document under WIPO Standard ST. 16 if possible. <sup>6</sup>Applicant is to place a check mark here if English language Translation is attached.



# UNITED STATES PATENT AND TRADEMARK OFFICE

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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
11/075,437	03/07/2005	Sandeep Kishan Singhal	20423-10036	5116
34415	7590	01/08/2007		
SYMANTEC/ FENWICK SILICON VALLEY CENTER 801 CALIFORNIA STREET MOUNTAIN VIEW, CA 94041			EXAMINER MEKY, MOUSTAFA M	
			ART UNIT	PAPER NUMBER
			2157	
SHORTENED STATUTORY PERIOD OF RESPONSE		NOTIFICATION DATE	DELIVERY MODE	
3 MONTHS		01/08/2007	ELECTRONIC	

Please find below and/or attached an Office communication concerning this application or proceeding.

If NO period for reply is specified above, the maximum statutory period will apply and will expire 6 MONTHS from the mailing date of this communication.

Notice of this Office communication was sent electronically on the above-indicated "Notification Date" and has a shortened statutory period for reply of 3 MONTHS from 01/08/2007.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

ptoc@fenwick.com  
bhoffman@fenwick.com  
qdinh@fenwick.com

<b>Office Action Summary</b>	<b>Application No.</b> 11/075,437	<b>Applicant(s)</b> SINGHAL ET AL.
	<b>Examiner</b> Moustafa M. Meky	<b>Art Unit</b> 2157

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

#### Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

#### Status

- 1) ☒ Responsive to communication(s) filed on 07 March 2005.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

#### Disposition of Claims

- 4) ☒ Claim(s) 1-24 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-24 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

#### Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

#### Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some \* c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
  2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

#### Attachment(s)

- |  |   |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892)  | 4) <input type="checkbox"/> Interview Summary (PTO-413)<br>Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)   | 5) <input type="checkbox"/> Notice of Informal Patent Application                       |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08)<br>Paper No(s)/Mail Date <u>10/3/2005</u> . | 6) <input type="checkbox"/> Other: _____  |

Art Unit: 2157

1. Claims 1-24 are presenting for examination.
2. The nonstatutory double patenting rejection is based on a judicially created doctrine grounded in public policy (a policy reflected in the statute) so as to prevent the unjustified or improper timewise extension of the "right to exclude" granted by a patent and to prevent possible harassment by multiple assignees. A nonstatutory obviousness-type double patenting rejection is appropriate where the conflicting claims are not identical, but at least one examined application claim is not patentably distinct from the reference claim(s) because the examined application claim is either anticipated by, or would have been obvious over, the reference claim(s). See, e.g., *In re Berg*, 140 F.3d 1428, 46 USPQ2d 1226 (Fed. Cir. 1998); *In re Goodman*, 11 F.3d 1046, 29 USPQ2d 2010 (Fed. Cir. 1993); *In re Longi*, 759 F.2d 887, 225 USPQ 645 (Fed. Cir. 1985); *In re Van Ornum*, 686 F.2d 937, 214 USPQ 761 (CCPA 1982); *In re Vogel*, 422 F.2d 438, 164 USPQ 619 (CCPA 1970); and *In re Thorington*, 418 F.2d 528, 163 USPQ 644 (CCPA 1969).

A timely filed terminal disclaimer in compliance with 37 CFR 1.321(c) or 1.321(d) may be used to overcome an actual or provisional rejection based on a nonstatutory double patenting ground provided the conflicting application or patent either is shown to be commonly owned with this application, or claims an invention made as a result of activities undertaken within the scope of a joint research agreement.

Effective January 1, 1994, a registered attorney or agent of record may sign a terminal disclaimer. A terminal disclaimer signed by the assignee must fully comply with 37 CFR 3.73(b).

3. Claims 1-24 are rejected on the ground of nonstatutory obviousness-type double patenting as being unpatentable over claims 1-57 of U.S. Patent No. 6,925,481. Although the conflicting claims are not identical, they are not patentably distinct from each other because the claims of the patent 481 substantially teaches the claimed limitations.
4. Claims 1-24 would be allowable upon receiving the terminal disclaimer.



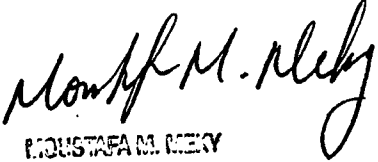
Art Unit: 2157

- 4.1. The prior art of record does not teach providing references to determined data manipulations operations for obtained data to a pervasive device that requests the data.
5. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.
6. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Moustafa M. Meky whose telephone number is 571-272-4005. The examiner can normally be reached on flex.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Ario Etienne can be reached on 571-272-4001. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

MMM  
12/29/2006

  
MOUSTAFA M. MEKY  
PRIMARY EXAMINER

<b>Notice of References Cited</b>	Application/Control No. 11/075,437	Applicant(s)/Patent Under Reexamination SINGHAL ET AL.	
	Examiner Moustafa M. Meky	Art Unit 2157	Page 1 of 1

U.S. PATENT DOCUMENTS

*		Document Number Country Code-Number-Kind Code	Date MM-YYYY	Name	Classification
*	A	US-2005/0113139	05-2005	Boss et al.	455/558
*	B	US-2002/0065110	05-2002	Enns et al.	455/566
	C	US-			
	D	US-			
	E	US-			
	F	US-			
	G	US-			
	H	US-			
	I	US-			
	J	US-			
	K	US-			
	L	US-			
	M	US-			

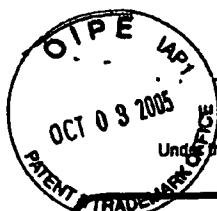
FOREIGN PATENT DOCUMENTS

*		Document Number Country Code-Number-Kind Code	Date MM-YYYY	Country	Name	Classification
	N					
	O					
	P					
	Q					
	R					
	S					
	T					

NON-PATENT DOCUMENTS

*		Include as applicable: Author, Title Date, Publisher, Edition or Volume, Pertinent Pages)
	U	
	V	
	W	
	X	

\*A copy of this reference is not being furnished with this Office action. (See MPEP § 707.05(a).)  
Dates in MM-YYYY format are publication dates. Classifications may be US or foreign.



PTO/SB/08A (10-01)  
Approved for use through 10/31/2002. OMB 0651-0031  
U.S. Patent and Trademark Office: U.S. DEPARTMENT OF COMMERCE  
Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it contains a valid OMB control number.

Substitute for form 1449A/PTO		<b>Complete If Known</b>			
<b>INFORMATION DISCLOSURE STATEMENT BY APPLICANT</b>		Application No.	11/075,437		
		Filing Date	March 7, 2005		
		First Named Inventor	Sandeep K. Singhal		
		Art Unit	<del>2161</del> 2157		
		Examiner Name	<del>Not Yet Known</del> Meby		
Sheet	1	of	1	Attorney Docket Number	20423-10036

U.S. PATENT DOCUMENTS				
Examiner Initials*	Cite No. <sup>1</sup>	Document No. Number - Kind Code <sup>2</sup> (if known)	Date MM-DD-YYYY	Name of Patentee or Applicant of Cited Document
MMM	A1	US-6,816,719	11-09-2004	Heinonen et al.
MMM	A2	US-6,785,598	07-20-2004	Lecton et al.
		US-		
		US-		
		US-		
		US-		
		US-		
		US-		
		US-		

FOREIGN PATENT DOCUMENTS					
Examiner Initials*	Cite No. <sup>1</sup>	Foreign Patent Document Country Code <sup>2</sup> - Number <sup>3</sup> Kind Code <sup>4</sup> (if known)	Publication Date MM-DD-YYYY	Name of Patentee or Applicant of Cited Document	T <sup>5</sup>

OTHER REFERENCES – NON-PATENT LITERATURE DOCUMENTS				
Examiner Initials*	Cite No. <sup>1</sup>	Include name of the author (in CAPITAL LETTERS), title of the article (when appropriate), title of the item (book, magazine, journal, serial, symposium, catalog, etc.), date, page(s), volume-issue number(s), publisher, city and/or country where published	T <sup>5</sup>	

Examiner Signature	M. Meby	Date Considered	12-29-2006
-----------------------	---------	--------------------	------------

\*EXAMINER: Initial if reference considered, whether or not citation is in conformance with MPEP 609.  
Draw line through citation if not in conformance and not considered. Include copy of this form with next communication to applicant.  
<sup>1</sup>Applicant's unique citation designation number (optional). <sup>2</sup>See Kinds Codes of USPTO Patent Documents at www.uspto.gov or MPEP 901.04. <sup>3</sup>Enter Office that issued the document, by the two-letter code (WIPO Standard ST.3). <sup>4</sup>For Japanese patent documents, the indication of the year of the reign of the Emperor must precede the serial number of the patent document. <sup>5</sup>Kind of document by the appropriate symbols as indicated on the document under WIPO Standard ST. 16 if possible. <sup>6</sup>Applicant is to place a check mark here if English language Translation is attached.

Electronic Acknowledgement Receipt	
EFS ID:	1468124
Application Number:	11075437
International Application Number:	
Confirmation Number:	5116
Title of Invention:	Technique for enabling remote data access and manipulation from a pervasive device
First Named Inventor/Applicant Name:	Sandeep Kishan Singhal
Customer Number:	34415
Filer:	Brian M. Hoffman
Filer Authorized By:	
Attorney Docket Number:	20423-10036
Receipt Date:	26-JAN-2007
Filing Date:	07-MAR-2005
Time Stamp:	18:56:57
Application Type:	Utility

Payment information:

Submitted with Payment	yes
Payment was successfully received in RAM	\$ 130
RAM confirmation Number	991
Deposit Account	192555
The Director of the USPTO is hereby authorized to charge indicated fees and credit any overpayment as follows: Charge any Additional Fees required under 37 C.F.R. Section 1.16 and 1.17	

File Listing:

--

Document Number	Document Description	File Name	File Size(Bytes)	Multi Part /.zip	Pages (if appl.)
1	Statutory disclaimers per MPEP 1490.	10036_Terminal_Disclaimer.pdf	72248	no	1
Warnings:					
Information:					
2	Amendment - After Non-Final Rejection	10036_Amendment_A_submitted_with_Terminal_Disclaimer.pdf	73799	no	2
Warnings:					
Information:					
3	Fee Worksheet (PTO-06)	fee-info.pdf	8177	no	2
Warnings:					
Information:					
Total Files Size (in bytes):			154224		
<p>This Acknowledgement Receipt evidences receipt on the noted date by the USPTO of the indicated documents, characterized by the applicant, and including page counts, where applicable. It serves as evidence of receipt similar to a Post Card, as described in MPEP 503.</p> <p><b><u>New Applications Under 35 U.S.C. 111</u></b> If a new application is being filed and the application includes the necessary components for a filing date (see 37 CFR 1.53(b)-(d) and MPEP 506), a Filing Receipt (37 CFR 1.54) will be issued in due course and the date shown on this Acknowledgement Receipt will establish the filing date of the application.</p> <p><b><u>National Stage of an International Application under 35 U.S.C. 371</u></b> If a timely submission to enter the national stage of an international application is compliant with the conditions of 35 U.S.C. 371 and other applicable requirements a Form PCT/DO/EO/903 indicating acceptance of the application as a national stage submission under 35 U.S.C. 371 will be issued in addition to the Filing Receipt, in due course.</p>					

TERMINAL DISCLAIMER TO OBVIATE A DOUBLE PATENTING REJECTION OVER A PRIOR PATENT		Docket Number (Optional) 20423-10036
In re Application of:	Sandeep K. Singhal et al.	
Application Serial No.:	11/075,437	
Filed:	March 7, 2005	
For:	Technique for Enabling Remote Data Access and Manipulation From a Pervasive Device	
<p>The owner, Symantec Corporation*, of the entire interest in the instant application hereby disclaims, except as provided below, the terminal part of the statutory term of any patent granted on the instant application, which would extend beyond the expiration date of the full statutory term defined in 35 U.S.C. 154 to 156 and 173, as presently shortened by any terminal disclaimer, of prior Patent No. 6,925,481. The owner hereby agrees that any patent so granted on the instant application shall be enforceable only for and during such period that it and the prior patent are commonly owned. This agreement runs with any patent granted on the instant application and is binding upon the grantee, its successors or assigns.</p> <p>In making the above disclaimer, the owner does not disclaim the terminal part of any patent granted on the instant application that would extend to the expiration date of the full statutory term as defined in 35 U.S.C. 154 to 156 and 173 of the prior patent, as presently shortened by any terminal disclaimer, in the event that it later: expires for failure to pay a maintenance fee; is held unenforceable; is found invalid by a court of competent jurisdiction; is statutorily disclaimed in whole or terminally disclaimed under 37 CFR § 1.321; has all claims canceled by a reexamination certificate, is reissued, or is in any manner terminated prior to the expiration of its full statutory term as presently shortened by any terminal disclaimer.</p> <p>Check either box 1 or 2 below, if appropriate.</p> <p>1. <input type="checkbox"/> For submissions on behalf of an organization (e.g. corporation, partnership, university, government agency, etc.), the undersigned is empowered to act on behalf of the organization.</p> <p>I hereby declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further, that these statements are made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001, Title 18 of the United States Code and that such willful false statements may jeopardize the validity of the application or any patent issuing thereon.</p> <p>2. <input checked="" type="checkbox"/> The undersigned is an attorney of record.</p> <div><div><u>January 26, 2007</u> Date</div><div><u>/Brian Hoffman/</u> Signature</div><div><u>Brian M. Hoffman, Reg. No. 39,713</u> Typed or printed name</div></div> <p><input checked="" type="checkbox"/> Terminal Disclaimer fee under 37 CFR 1.20(d) included</p> <p><input type="checkbox"/> Fee Transmittal included</p> <p><input checked="" type="checkbox"/> PTO suggested wording for terminal disclaimer was</p> <p><input checked="" type="checkbox"/> unchanged      <input type="checkbox"/> changed (if changed, an explanation should be supplied).</p> <p>*Certificate under 37 CFR 3.73(b) is required if terminal disclaimer is signed by the assignee</p>		
[Page 1 of 1]		

**IN THE UNITED STATES  
PATENT AND TRADEMARK OFFICE**

APPLICANT: Sandeep Kishan Singhal, Barry Eliot Levinson and Darren Michael Sanders  
APPLICATION NO.: 11/075,437  
FILING DATE: March 7, 2005  
TITLE: Technique For Enabling Remote Data Access And Manipulation From A Pervasive Device  
EXAMINER: Not Yet Known  
GROUP ART UNIT: 2161  
ATTY. DKT. NO.: 20423-10036

---

MAIL STOP AMENDMENT  
COMMISSIONER FOR PATENTS  
P.O. BOX 1450  
ALEXANDRIA, VA 22313-1450

**AMENDMENT A**

Sir:

This is in response to the Office Action mailed January 8, 2007.

Claims 1-24 are presented for examination and pending in this application. In the latest Office Action, claims 1-24 were rejected under the judicially created doctrine of obvious-type double patenting based on commonly owned U.S. Patent No. 6,925,481 to Sandeep Singhal et al. In response, Applicants herewith submit a terminal disclaimer to obviate the double patenting rejection, pursuant to 37 C.F.R. § 1.321(c).

Accordingly, the application is in condition for allowance of all pending claims, and a Notice of Allowance is respectfully requested. If the examiner believes that for any reason direct

contact with Applicant's representative would help advance the prosecution of this case to allowance, the examiner is encouraged to telephone the undersigned at the number given below.

Respectfully submitted,  
SANDEEP K. SINGHAL ET AL.

Dated: January 26, 2007


By: /Brian Hoffman/  
Brian M. Hoffman, Reg. No. 39,713  
Attorney for Applicant  
Fenwick & West LLP  
801 California Street  
Mountain View, CA 94041  
Tel.: (415) 875-2484  
Fax: (415) 281-1350



Electronic Patent Application Fee Transmittal					
Application Number:		11075437			
Filing Date:		07-Mar-2005			
Title of Invention:		Technique for enabling remote data access and manipulation from a pervasive device			
First Named Inventor/Applicant Name:		Sandeep Kishan Singhal			
Filer:		Brian M. Hoffman			
Attorney Docket Number:		20423-10036			
Filed as Large Entity					
Utility      Filing Fees					
Description		Fee Code	Quantity	Amount	Sub-Total in USD(\$)
Basic Filing:					
Pages:					
Claims:					
Miscellaneous-Filing:					
Petition:					
Patent-Appeals-and-Interference:					
Post-Allowance-and-Post-Issuance:					
Statutory disclaimer		1814	1	130	130
Extension-of-Time:					

Description	Fee Code	Quantity	Amount	Sub-Total in USD(\$)
Miscellaneous:				
Total in USD (\$)				130

Transaction History Date 2007-02-03  
Date information retrieved from USPTO Patent  
Application Information Retrieval (PAIR)  
system records at [www.uspto.gov](http://www.uspto.gov)

<b>Application Number</b> 	<b>Application/Control No.</b> 11/075,437	<b>Applicant(s)/Patent under Reexamination</b> SINGHAL ET AL.
<b>Document Code - DISQ</b>		<b>Internal Document – DO NOT MAIL</b>

<b>TERMINAL DISCLAIMER</b>	<input checked="" type="checkbox"/> <b>APPROVED</b>	<input type="checkbox"/> <b>DISAPPROVED</b>
Date Filed : 012607	This patent is subject to a Terminal Disclaimer	

<b>Approved/Disapproved by:</b>
jrm

Transaction History Date 2007-04-20

Date information retrieved from USPTO Patent  
Application Information Retrieval (PAIR)  
system records at [www.uspto.gov](http://www.uspto.gov)

Notice of Allowability	Application No.	Applicant(s)	
	11/075,437	SINGHAL ET AL.	
	Examiner	Art Unit	
	Moustafa M. Meky	2157	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address--

All claims being allowable, PROSECUTION ON THE MERITS IS (OR REMAINS) CLOSED in this application. If not included herewith (or previously mailed), a Notice of Allowance (PTOL-85) or other appropriate communication will be mailed in due course. **THIS NOTICE OF ALLOWABILITY IS NOT A GRANT OF PATENT RIGHTS.** This application is subject to withdrawal from issue at the initiative of the Office or upon petition by the applicant. See 37 CFR 1.313 and MPEP 1308.

1. ☒ This communication is responsive to the terminal disclaimer filed 1/26/2007.

2. ☒ The allowed claim(s) is/are 1-24.

3. ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).  
a) ☐ All b) ☐ Some\* c) ☐ None of the:  
1. ☐ Certified copies of the priority documents have been received.  
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.  
3. ☐ Copies of the certified copies of the priority documents have been received in this national stage application from the International Bureau (PCT Rule 17.2(a)).  
\* Certified copies not received: \_\_\_\_\_.

Applicant has THREE MONTHS FROM THE "MAILING DATE" of this communication to file a reply complying with the requirements noted below. Failure to timely comply will result in ABANDONMENT of this application.  
**THIS THREE-MONTH PERIOD IS NOT EXTENDABLE.**

4. ☐ A SUBSTITUTE OATH OR DECLARATION must be submitted. Note the attached EXAMINER'S AMENDMENT or NOTICE OF INFORMAL PATENT APPLICATION (PTO-152) which gives reason(s) why the oath or declaration is deficient.

5. ☐ CORRECTED DRAWINGS (as "replacement sheets") must be submitted.  
(a) ☐ including changes required by the Notice of Draftsperson's Patent Drawing Review (PTO-948) attached  
1) ☐ hereto or 2) ☐ to Paper No./Mail Date \_\_\_\_\_.  
(b) ☐ including changes required by the attached Examiner's Amendment / Comment or in the Office action of Paper No./Mail Date \_\_\_\_\_.  
Identifying indicia such as the application number (see 37 CFR 1.84(c)) should be written on the drawings in the front (not the back) of each sheet. Replacement sheet(s) should be labeled as such in the header according to 37 CFR 1.121(d).

6. ☐ DEPOSIT OF and/or INFORMATION about the deposit of BIOLOGICAL MATERIAL must be submitted. Note the attached Examiner's comment regarding REQUIREMENT FOR THE DEPOSIT OF BIOLOGICAL MATERIAL.

Attachment(s)

1. <input checked="" type="checkbox"/> Notice of References Cited (PTO-892)	5. <input type="checkbox"/> Notice of Informal Patent Application
2. <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)	6. <input checked="" type="checkbox"/> Interview Summary (PTO-413), Paper No./Mail Date <u>4/12/07</u> .
3. <input type="checkbox"/> Information Disclosure Statements (PTO/SB/08), Paper No./Mail Date _____	7. <input checked="" type="checkbox"/> Examiner's Amendment/Comment
4. <input type="checkbox"/> Examiner's Comment Regarding Requirement for Deposit of Biological Material	8. <input type="checkbox"/> Examiner's Statement of Reasons for Allowance
	9. <input type="checkbox"/> Other _____

*Moustafa M. Meky*  
MOUSTAFA M. MEKY  
PRIMARY EXAMINER

**EXAMINER'S AMENDMENT**

An examiner's amendment to the record appears below. Should the changes and/or additions be unacceptable to applicant, an amendment may be filed as provided by 37 CFR 1.312. To ensure consideration of such an amendment, it MUST be submitted no later than the payment of the issue fee.

Authorization for this examiner's amendment was given in a telephone interview with Mr. Brian Hoffman on 4/12/2007.

The application has been amended as follows:

**IN THE CLAIMS**

9. (Amended) A computer program product having a computer-readable medium having computer program code encoded thereon to be executed by a processor for enabling data access and manipulating from a pervasive device, the computer program code adapted to perform steps comprising:

receiving a data access request from a pervasive device;

obtaining the requested data;

determining what data manipulation operations are available for the obtained data; and

providing references to the determined data manipulation operations to the pervasive device.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Moustafa M. Meky whose telephone number is 571-272-4005.

The examiner can normally be reached on flex.

Application/Control Number: 11/075,437

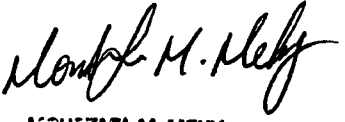
Page 3

Art Unit: 2157

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Ario Etienne can be reached on 571-272-4001. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

MMM  
4/12/2007

  
MUSTAFA M. MEKY  
PATENT EXAMINER

<b>Notice of References Cited</b>	Application/Control No. 11/075,437	Applicant(s)/Patent Under Reexamination SINGHAL ET AL.	
	Examiner Moustafa M. Meky	Art Unit 2157	Page 1 of 1

U.S. PATENT DOCUMENTS

*		Document Number Country Code-Number-Kind Code	Date MM-YYYY	Name	Classification
*	A	US-2002/0102965	08-2002	Mandahl et al.	455/412
*	B	US-2002/0065110	05-2002	Enns et al.	455/566
*	C	US-2004/0194014	09-2004	Anwar, Majid	715/500
*	D	US-6,640,106	10-2003	Gutowski et al.	455/456.1
	E	US-			
	F	US-			
	G	US-			
	H	US-			
	I	US-			
	J	US-			
	K	US-			
	L	US-			
	M	US-			

FOREIGN PATENT DOCUMENTS

*		Document Number Country Code-Number-Kind Code	Date MM-YYYY	Country	Name	Classification
	N					
	O					
	P					
	Q					
	R					
	S					
	T					

NON-PATENT DOCUMENTS

*		Include as applicable: Author, Title Date, Publisher, Edition or Volume, Pertinent Pages)
	U	
	V	
	W	
	X	

\*A copy of this reference is not being furnished with this Office action. (See MPEP § 707.05(a).)  
Dates in MM-YYYY format are publication dates. Classifications may be US or foreign.

<b>Interview Summary</b>	<b>Application No.</b>	<b>Applicant(s)</b>	
	11/075,437	SINGHAL ET AL.	
	<b>Examiner</b>	<b>Art Unit</b>	
	Moustafa M. Meky	2157	

All participants (applicant, applicant's representative, PTO personnel):

(1) Moustafa M. Meky. (3) \_\_\_\_\_.

(2) Brian Hoffman. (4) \_\_\_\_\_.

Date of Interview: 12 April 2007.

Type: a) ☒ Telephonic b) ☐ Video Conference  
c) ☐ Personal [copy given to: 1) ☐ applicant 2) ☐ applicant's representative]

Exhibit shown or demonstration conducted: d) ☐ Yes e) ☒ No.  
If Yes, brief description: \_\_\_\_\_.

Claim(s) discussed: 9.

Identification of prior art discussed: NONE.

Agreement with respect to the claims f) ☒ was reached. g) ☐ was not reached. h) ☐ N/A.

Substance of Interview including description of the general nature of what was agreed to if an agreement was reached, or any other comments: The examiner informed the applicant that the examiner failed to raise the issue of 101 rejection. The applicant and the examiner agreed to amend the preamble of claim 9 to overcome a potential 35 U.S.C. 101 rejection.

(A fuller description, if necessary, and a copy of the amendments which the examiner agreed would render the claims allowable, if available, must be attached. Also, where no copy of the amendments that would render the claims allowable is available, a summary thereof must be attached.)

THE FORMAL WRITTEN REPLY TO THE LAST OFFICE ACTION MUST INCLUDE THE SUBSTANCE OF THE INTERVIEW. (See MPEP Section 713.04). If a reply to the last Office action has already been filed, APPLICANT IS GIVEN A NON-EXTENDABLE PERIOD OF THE LONGER OF ONE MONTH OR THIRTY DAYS FROM THIS INTERVIEW DATE, OR THE MAILING DATE OF THIS INTERVIEW SUMMARY FORM, WHICHEVER IS LATER, TO FILE A STATEMENT OF THE SUBSTANCE OF THE INTERVIEW. See Summary of Record of Interview requirements on reverse side or on attached sheet.

Examiner Note: You must sign this form unless it is an Attachment to a signed Office action.

\_\_\_\_\_  
Examiner's signature, if required



## Summary of Record of Interview Requirements

### Manual of Patent Examining Procedure (MPEP), Section 713.04, Substance of Interview Must be Made of Record

A complete written statement as to the substance of any face-to-face, video conference, or telephone interview with regard to an application must be made of record in the application whether or not an agreement with the examiner was reached at the interview.

### Title 37 Code of Federal Regulations (CFR) § 1.133 Interviews Paragraph (b)

In every instance where reconsideration is requested in view of an interview with an examiner, a complete written statement of the reasons presented at the interview as warranting favorable action must be filed by the applicant. An interview does not remove the necessity for reply to Office action as specified in §§ 1.111, 1.135. (35 U.S.C. 132)

### 37 CFR §1.2 Business to be transacted in writing.

All business with the Patent or Trademark Office should be transacted in writing. The personal attendance of applicants or their attorneys or agents at the Patent and Trademark Office is unnecessary. The action of the Patent and Trademark Office will be based exclusively on the written record in the Office. No attention will be paid to any alleged oral promise, stipulation, or understanding in relation to which there is disagreement or doubt.

The action of the Patent and Trademark Office cannot be based exclusively on the written record in the Office if that record is itself incomplete through the failure to record the substance of interviews.

It is the responsibility of the applicant or the attorney or agent to make the substance of an interview of record in the application file, unless the examiner indicates he or she will do so. It is the examiner's responsibility to see that such a record is made and to correct material inaccuracies which bear directly on the question of patentability.

Examiners must complete an Interview Summary Form for each interview held where a matter of substance has been discussed during the interview by checking the appropriate boxes and filling in the blanks. Discussions regarding only procedural matters, directed solely to restriction requirements for which interview recordation is otherwise provided for in Section 812.01 of the Manual of Patent Examining Procedure, or pointing out typographical errors or unreadable script in Office actions or the like, are excluded from the interview recordation procedures below. Where the substance of an interview is completely recorded in an Examiners Amendment, no separate Interview Summary Record is required.

The Interview Summary Form shall be given an appropriate Paper No., placed in the right hand portion of the file, and listed on the "Contents" section of the file wrapper. In a personal interview, a duplicate of the Form is given to the applicant (or attorney or agent) at the conclusion of the interview. In the case of a telephone or video-conference interview, the copy is mailed to the applicant's correspondence address either with or prior to the next official communication. If additional correspondence from the examiner is not likely before an allowance or if other circumstances dictate, the Form should be mailed promptly after the interview rather than with the next official communication.

The Form provides for recordation of the following information:

- Application Number (Series Code and Serial Number)
- Name of applicant
- Name of examiner
- Date of interview
- Type of interview (telephonic, video-conference, or personal)
- Name of participant(s) (applicant, attorney or agent, examiner, other PTO personnel, etc.)
- An indication whether or not an exhibit was shown or a demonstration conducted
- An identification of the specific prior art discussed
- An indication whether an agreement was reached and if so, a description of the general nature of the agreement (may be by attachment of a copy of amendments or claims agreed as being allowable). Note: Agreement as to allowability is tentative and does not restrict further action by the examiner to the contrary.
- The signature of the examiner who conducted the interview (if Form is not an attachment to a signed Office action)

It is desirable that the examiner orally remind the applicant of his or her obligation to record the substance of the interview of each case. It should be noted, however, that the Interview Summary Form will not normally be considered a complete and proper recordation of the interview unless it includes, or is supplemented by the applicant or the examiner to include, all of the applicable items required below concerning the substance of the interview.

A complete and proper recordation of the substance of any interview should include at least the following applicable items:

- 1) A brief description of the nature of any exhibit shown or any demonstration conducted,
- 2) an identification of the claims discussed,
- 3) an identification of the specific prior art discussed,
- 4) an identification of the principal proposed amendments of a substantive nature discussed, unless these are already described on the Interview Summary Form completed by the Examiner,
- 5) a brief identification of the general thrust of the principal arguments presented to the examiner,  
(The identification of arguments need not be lengthy or elaborate. A verbatim or highly detailed description of the arguments is not required. The identification of the arguments is sufficient if the general nature or thrust of the principal arguments made to the examiner can be understood in the context of the application file. Of course, the applicant may desire to emphasize and fully describe those arguments which he or she feels were or might be persuasive to the examiner.)
- 6) a general indication of any other pertinent matters discussed, and
- 7) if appropriate, the general results or outcome of the interview unless already described in the Interview Summary Form completed by the examiner.

Examiners are expected to carefully review the applicant's record of the substance of an interview. If the record is not complete and accurate, the examiner will give the applicant an extendable one month time period to correct the record.

### Examiner to Check for Accuracy

If the claims are allowable for other reasons of record, the examiner should send a letter setting forth the examiner's version of the statement attributed to him or her. If the record is complete and accurate, the examiner should place the indication, "Interview Record OK" on the paper recording the substance of the interview along with the date and the examiner's initials.



UNITED STATES PATENT AND TRADEMARK OFFICE

**UNITED STATES DEPARTMENT OF COMMERCE**  
United States Patent and Trademark Office  
Address: COMMISSIONER FOR PATENTS  
P.O. Box 1450  
Alexandria, Virginia 22313-1450  
www.uspto.gov

MN

NOTICE OF ALLOWANCE AND FEE(S) DUE

34415 7590 04/20/2007  
SYMANTEC/ FENWICK  
SILICON VALLEY CENTER  
801 CALIFORNIA STREET  
MOUNTAIN VIEW, CA 94041

EXAMINER	
MEKY, MOUSTAFA M	
ART UNIT	PAPER NUMBER
2157	
DATE MAILED: 04/20/2007	

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
11/075,437	03/07/2005	Sandeep Kishan Singhal	20423-10036	5116
TITLE OF INVENTION: TECHNIQUE FOR ENABLING REMOTE DATA ACCESS AND MANIPULATION FROM A PERVASIVE DEVICE				

APPLN. TYPE	SMALL ENTITY	ISSUE FEE DUE	PUBLICATION FEE DUE	PREV. PAID ISSUE FEE	TOTAL FEE(S) DUE	DATE DUE
nonprovisional	NO	\$1400	\$300	\$0	\$1700	07/20/2007

THE APPLICATION IDENTIFIED ABOVE HAS BEEN EXAMINED AND IS ALLOWED FOR ISSUANCE AS A PATENT. PROSECUTION ON THE MERITS IS CLOSED. THIS NOTICE OF ALLOWANCE IS NOT A GRANT OF PATENT RIGHTS. THIS APPLICATION IS SUBJECT TO WITHDRAWAL FROM ISSUE AT THE INITIATIVE OF THE OFFICE OR UPON PETITION BY THE APPLICANT. SEE 37 CFR 1.313 AND MPEP 1308.

THE ISSUE FEE AND PUBLICATION FEE (IF REQUIRED) MUST BE PAID WITHIN THREE MONTHS FROM THE MAILING DATE OF THIS NOTICE OR THIS APPLICATION SHALL BE REGARDED AS ABANDONED. THIS STATUTORY PERIOD CANNOT BE EXTENDED. SEE 35 U.S.C. 151. THE ISSUE FEE DUE INDICATED ABOVE DOES NOT REFLECT A CREDIT FOR ANY PREVIOUSLY PAID ISSUE FEE IN THIS APPLICATION. IF AN ISSUE FEE HAS PREVIOUSLY BEEN PAID IN THIS APPLICATION (AS SHOWN ABOVE), THE RETURN OF PART B OF THIS FORM WILL BE CONSIDERED A REQUEST TO REAPPLY THE PREVIOUSLY PAID ISSUE FEE TOWARD THE ISSUE FEE NOW DUE.

HOW TO REPLY TO THIS NOTICE:

I. Review the SMALL ENTITY status shown above.

If the SMALL ENTITY is shown as YES, verify your current SMALL ENTITY status:

A. If the status is the same, pay the TOTAL FEE(S) DUE shown above.

B. If the status above is to be removed, check box 5b on Part B - Fee(s) Transmittal and pay the PUBLICATION FEE (if required) and twice the amount of the ISSUE FEE shown above, or

If the SMALL ENTITY is shown as NO:

A. Pay TOTAL FEE(S) DUE shown above, or

B. If applicant claimed SMALL ENTITY status before, or is now claiming SMALL ENTITY status, check box 5a on Part B - Fee(s) Transmittal and pay the PUBLICATION FEE (if required) and 1/2 the ISSUE FEE shown above.

II. PART B - FEE(S) TRANSMITTAL, or its equivalent, must be completed and returned to the United States Patent and Trademark Office (USPTO) with your ISSUE FEE and PUBLICATION FEE (if required). If you are charging the fee(s) to your deposit account, section "4b" of Part B - Fee(s) Transmittal should be completed and an extra copy of the form should be submitted. If an equivalent of Part B is filed, a request to reapply a previously paid issue fee must be clearly made, and delays in processing may occur due to the difficulty in recognizing the paper as an equivalent of Part B.

III. All communications regarding this application must give the application number. Please direct all communications prior to issuance to Mail Stop ISSUE FEE unless advised to the contrary.

IMPORTANT REMINDER: Utility patents issuing on applications filed on or after Dec. 12, 1980 may require payment of maintenance fees. It is patentee's responsibility to ensure timely payment of maintenance fees when due.

# PART B - FEE(S) TRANSMITTAL

Complete and send this form, together with applicable fee(s), to: **Mail** Mail Stop ISSUE FEE  
**Commissioner for Patents**  
**P.O. Box 1450**  
**Alexandria, Virginia 22313-1450**  
**or Fax** (571)-273-2885

INSTRUCTIONS: This form should be used for transmitting the ISSUE FEE and PUBLICATION FEE (if required). Blocks 1 through 5 should be completed where appropriate. All further correspondence including the Patent, advance orders and notification of maintenance fees will be mailed to the current correspondence address as indicated unless corrected below or directed otherwise in Block 1, by (a) specifying a new correspondence address; and/or (b) indicating a separate "FEE ADDRESS" for maintenance fee notifications.

CURRENT CORRESPONDENCE ADDRESS (Note: Use Block 1 for any change of address)

34415 7590 04/20/2007

SYMANTEC/ FENWICK  
SILICON VALLEY CENTER  
801 CALIFORNIA STREET  
MOUNTAIN VIEW, CA 94041

Note: A certificate of mailing can only be used for domestic mailings of the Fee(s) Transmittal. This certificate cannot be used for any other accompanying papers. Each additional paper, such as an assignment or formal drawing, must have its own certificate of mailing or transmission.

## Certificate of Mailing or Transmission

I hereby certify that this Fee(s) Transmittal is being deposited with the United States Postal Service with sufficient postage for first class mail in an envelope addressed to the Mail Stop ISSUE FEE address above, or being facsimile transmitted to the USPTO (571) 273-2885, on the date indicated below.

(Depositor's name)
(Signature)
(Date)

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
11/075,437	03/07/2005	Sandeep Kishan Singhal	20423-10036	5116

TITLE OF INVENTION: TECHNIQUE FOR ENABLING REMOTE DATA ACCESS AND MANIPULATION FROM A PERVASIVE DEVICE

APPLN. TYPE	SMALL ENTITY	ISSUE FEE DUE	PUBLICATION FEE DUE	PREV. PAID ISSUE FEE	TOTAL FEE(S) DUE	DATE DUE
nonprovisional	NO	\$1400	\$300	\$0	\$1700	07/20/2007

EXAMINER	ART UNIT	CLASS-SUBCLASS
MEKY, MOUSTAFA M	2157	709-218000

1. Change of correspondence address or indication of "Fee Address" (37 CFR 1.363).  
☐ Change of correspondence address (or Change of Correspondence Address form PTO/SB/122) attached.  
☐ "Fee Address" indication (or "Fee Address" Indication form PTO/SB/47; Rev 03-02 or more recent) attached. Use of a Customer Number is required.

2. For printing on the patent front page, list  
(1) the names of up to 3 registered patent attorneys or agents OR, alternatively,  
(2) the name of a single firm (having as a member a registered attorney or agent) and the names of up to 2 registered patent attorneys or agents. If no name is listed, no name will be printed.  
1 \_\_\_\_\_  
2 \_\_\_\_\_  
3 \_\_\_\_\_

## 3. ASSIGNEE NAME AND RESIDENCE DATA TO BE PRINTED ON THE PATENT (print or type)

PLEASE NOTE: Unless an assignee is identified below, no assignee data will appear on the patent. If an assignee is identified below, the document has been filed for recordation as set forth in 37 CFR 3.11. Completion of this form is NOT a substitute for filing an assignment.

(A) NAME OF ASSIGNEE (B) RESIDENCE: (CITY and STATE OR COUNTRY)

Please check the appropriate assignee category or categories (will not be printed on the patent) : ☐ Individual ☐ Corporation or other private group entity ☐ Government

## 4a. The following fee(s) are submitted:

☐ Issue Fee  
☐ Publication Fee (No small entity discount permitted)  
☐ Advance Order - # of Copies \_\_\_\_\_

## 4b. Payment of Fee(s): (Please first reapply any previously paid issue fee shown above)

☐ A check is enclosed.  
☐ Payment by credit card. Form PTO-2038 is attached.  
☐ The Director is hereby authorized to charge the required fee(s), any deficiency, or credit any overpayment, to Deposit Account Number \_\_\_\_\_ (enclose an extra copy of this form).

## 5. Change in Entity Status (from status indicated above)

☐ a. Applicant claims SMALL ENTITY status. See 37 CFR 1.27. ☐ b. Applicant is no longer claiming SMALL ENTITY status. See 37 CFR 1.27(g)(2).

NOTE: The Issue Fee and Publication Fee (if required) will not be accepted from anyone other than the applicant; a registered attorney or agent; or the assignee or other party in interest as shown by the records of the United States Patent and Trademark Office.

Authorized Signature \_\_\_\_\_

Date \_\_\_\_\_

Typed or printed name \_\_\_\_\_

Registration No. \_\_\_\_\_

This collection of information is required by 37 CFR 1.311. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.14. This collection is estimated to take 12 minutes to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, Virginia 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, Virginia 22313-1450.

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UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE  
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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
11/075,437	03/07/2005	Sandeep Kishan Singhal	20423-10036	5116
34415	7590	04/20/2007	EXAMINER	
SYMANTEC/ FENWICK SILICON VALLEY CENTER 801 CALIFORNIA STREET MOUNTAIN VIEW, CA 94041			MEKY, MOUSTAFA M	
			ART UNIT	PAPER NUMBER
			2157	
DATE MAILED: 04/20/2007				

Determination of Patent Term Adjustment under 35 U.S.C. 154 (b)  
(application filed on or after May 29, 2000)

The Patent Term Adjustment to date is 246 day(s). If the issue fee is paid on the date that is three months after the mailing date of this notice and the patent issues on the Tuesday before the date that is 28 weeks (six and a half months) after the mailing date of this notice, the Patent Term Adjustment will be 246 day(s).

If a Continued Prosecution Application (CPA) was filed in the above-identified application, the filing date that determines Patent Term Adjustment is the filing date of the most recent CPA.

Applicant will be able to obtain more detailed information by accessing the Patent Application Information Retrieval (PAIR) WEB site (<http://pair.uspto.gov>).

Any questions regarding the Patent Term Extension or Adjustment determination should be directed to the Office of Patent Legal Administration at (571)-272-7702. Questions relating to issue and publication fee payments should be directed to the Customer Service Center of the Office of Patent Publication at 1-(888)-786-0101 or (571)-272-4200.

## Electronic Acknowledgement Receipt

<b>EFS ID:</b>	1934230
<b>Application Number:</b>	11075437
<b>International Application Number:</b>	
<b>Confirmation Number:</b>	5116
<b>Title of Invention:</b>	TECHNIQUE FOR ENABLING REMOTE DATA ACCESS AND MANIPULATION FROM A PERVASIVE DEVICE
<b>First Named Inventor/Applicant Name:</b>	Sandeep Kishan Singhal
<b>Customer Number:</b>	34415
<b>Filer:</b>	Brian M. Hoffman
<b>Filer Authorized By:</b>	
<b>Attorney Docket Number:</b>	20423-10036
<b>Receipt Date:</b>	02-JUL-2007
<b>Filing Date:</b>	07-MAR-2005
<b>Time Stamp:</b>	19:32:18
<b>Application Type:</b>	Utility

### Payment information:

Submitted with Payment	yes
Payment was successfully received in RAM	\$ 1700
RAM confirmation Number	3421
Deposit Account	192555
The Director of the USPTO is hereby authorized to charge indicated fees and credit any overpayment as follows: Charge any Additional Fees required under 37 C.F.R. Section 1.16 and 1.17	

### File Listing:

Document Number	Document Description	File Name	File Size(Bytes)	Multi Part /.zip	Pages (if appl.)
1	Issue Fee Payment (PTO-85B)	10036_Issue_Fee.pdf	91505	no	1
Warnings:					
Information:					
2	Fee Worksheet (PTO-06)	fee-info.pdf	8334	no	2
Warnings:					
Information:					
Total Files Size (in bytes):			99839		
<p>This Acknowledgement Receipt evidences receipt on the noted date by the USPTO of the indicated documents, characterized by the applicant, and including page counts, where applicable. It serves as evidence of receipt similar to a Post Card, as described in MPEP 503.</p> <p><b><u>New Applications Under 35 U.S.C. 111</u></b> If a new application is being filed and the application includes the necessary components for a filing date (see 37 CFR 1.53(b)-(d) and MPEP 506), a Filing Receipt (37 CFR 1.54) will be issued in due course and the date shown on this Acknowledgement Receipt will establish the filing date of the application.</p> <p><b><u>National Stage of an International Application under 35 U.S.C. 371</u></b> If a timely submission to enter the national stage of an international application is compliant with the conditions of 35 U.S.C. 371 and other applicable requirements a Form PCT/DO/EO/903 indicating acceptance of the application as a national stage submission under 35 U.S.C. 371 will be issued in addition to the Filing Receipt, in due course.</p> <p><b><u>New International Application Filed with the USPTO as a Receiving Office</u></b> If a new international application is being filed and the international application includes the necessary components for an international filing date (see PCT Article 11 and MPEP 1810), a Notification of the International Application Number and of the International Filing Date (Form PCT/RO/105) will be issued in due course, subject to prescriptions concerning national security, and the date shown on this Acknowledgement Receipt will establish the international filing date of the application.</p>					

# PART B - FEE(S) TRANSMITTAL

Complete and send this form, together with applicable fee(s), to: **Mail** Mail Stop ISSUE FEE  
**Commissioner for Patents**  
**P.O. Box 1450**  
**Alexandria, Virginia 22313-1450**  
**or Fax (571)-273-2885**

INSTRUCTIONS: This form should be used for transmitting the ISSUE FEE and PUBLICATION FEE (if required). Blocks 1 through 5 should be completed where appropriate. All further correspondence including the Patent, advance orders and notification of maintenance fees will be mailed to the current correspondence address as indicated unless corrected below or directed otherwise in Block 1, by (a) specifying a new correspondence address; and/or (b) indicating a separate "FEE ADDRESS" for maintenance fee notifications.

CURRENT CORRESPONDENCE ADDRESS (Note: Use Block 1 for any change of address)

34415 7590 04/20/2007

SYMANTEC/ FENWICK  
 SILICON VALLEY CENTER  
 801 CALIFORNIA STREET  
 MOUNTAIN VIEW, CA 94041

Note: A certificate of mailing can only be used for domestic mailings of the Fee(s) Transmittal. This certificate cannot be used for any other accompanying papers. Each additional paper, such as an assignment or formal drawing, must have its own certificate of mailing or transmission.

**Certificate of Mailing or Transmission**  
 I hereby certify that this Fee(s) Transmittal is being deposited with the United States Postal Service with sufficient postage for first class mail in an envelope addressed to the Mail Stop ISSUE FEE address above, or being facsimile transmitted to the USPTO (571) 273-2885, on the date indicated below.

(Depositor's name)
(Signature)
(Date)

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
11/075,437	03/07/2005	Sandeep Kishan Singhal	20423-10036	5116

TITLE OF INVENTION: TECHNIQUE FOR ENABLING REMOTE DATA ACCESS AND MANIPULATION FROM A PERVERSIVE DEVICE

APPLN. TYPE	SMALL ENTITY	ISSUE FEE DUE	PUBLICATION FEE DUE	PREV. PAID ISSUE FEE	TOTAL FEE(S) DUE	DATE DUE
nonprovisional	NO	\$1400	\$300	\$0	\$1700	07/20/2007

EXAMINER	ART UNIT	CLASS-SUBCLASS
MEKY, MOUSTAFA M	2157	709-218000

1. Change of correspondence address or indication of "Fee Address" (37 CFR 1.363).

- ☐ Change of correspondence address (or Change of Correspondence Address form PTO/SB/122) attached.  
☐ "Fee Address" indication (or "Fee Address" Indication form PTO/SB/47; Rev 03-02 or more recent) attached. Use of a Customer Number is required.

2. For printing on the patent front page, list

- (1) the names of up to 3 registered patent attorneys or agents OR, alternatively,  
 (2) the name of a single firm (having as a member a registered attorney or agent) and the names of up to 2 registered patent attorneys or agents. If no name is listed, no name will be printed.

1 Fenwick & West LLP

2

3

3. ASSIGNEE NAME AND RESIDENCE DATA TO BE PRINTED ON THE PATENT (print or type)

PLEASE NOTE: Unless an assignee is identified below, no assignee data will appear on the patent. If an assignee is identified below, the document has been filed for recordation as set forth in 37 CFR 3.11. Completion of this form is NOT a substitute for filing an assignment.

(A) NAME OF ASSIGNEE

(B) RESIDENCE: (CITY and STATE OR COUNTRY)

Symantec Corporation

Cupertino, CA

Please check the appropriate assignee category or categories (will not be printed on the patent): ☐ Individual ☒ Corporation or other private group entity ☐ Government

4a. The following fee(s) are submitted:

- ☒ Issue Fee  
☒ Publication Fee (No small entity discount permitted)  
☐ Advance Order - # of Copies

4b. Payment of Fee(s): (Please first reapply any previously paid issue fee shown above)

- ☐ A check is enclosed.  
☐ Payment by credit card. Form PTO-2038 is attached.  
☒ The Director is hereby authorized to charge the required fee(s), any deficiency, or credit any overpayment, to Deposit Account Number 19-2555 (enclose an extra copy of this form).

5. Change in Entity Status (from status indicated above)

- ☐ a. Applicant claims SMALL ENTITY status. See 37 CFR 1.27. ☐ b. Applicant is no longer claiming SMALL ENTITY status. See 37 CFR 1.27(g)(2).

NOTE: The Issue Fee and Publication Fee (if required) will not be accepted from anyone other than the applicant; a registered attorney or agent; or the assignee or other party in interest as shown by the records of the United States Patent and Trademark Office.

Authorized Signature 

Date July 2, 2007

Typed or printed name Brian M. Hoffman

Registration No. 39,713

This collection of information is required by 37 CFR 1.311. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.14. This collection is estimated to take 12 minutes to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, Virginia 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, Virginia 22313-1450.

Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it displays a valid OMB control number.

Electronic Patent Application Fee Transmittal				
Application Number:		11075437		
Filing Date:		07-Mar-2005		
Title of Invention:		TECHNIQUE FOR ENABLING REMOTE DATA ACCESS AND MANIPULATION FROM A PERVASIVE DEVICE		
First Named Inventor/Applicant Name:		Sandeep Kishan Singhal		
Filer:		Brian M. Hoffman		
Attorney Docket Number:		20423-10036		
Filed as Large Entity				
Utility      Filing Fees				
Description	Fee Code	Quantity	Amount	Sub-Total in USD(\$)
Basic Filing:				
Pages:				
Claims:				
Miscellaneous-Filing:				
Petition:				
Patent-Appeals-and-Interference:				
Post-Allowance-and-Post-Issuance:				
Utility Appl issue fee	1501	1	1400	1400
Publ. Fee- early, voluntary, or normal	1504	1	300	300



Description	Fee Code	Quantity	Amount	Sub-Total in USD(\$)
Extension-of-Time:				
Miscellaneous:				
Total in USD (\$)				1700



## UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE  
United States Patent and Trademark Office  
Address: COMMISSIONER FOR PATENTS  
P O Box 1450  
Alexandria, Virginia 22313-1450  
[www.uspto.gov](http://www.uspto.gov)

APPLICATION NO.	ISSUE DATE	PATENT NO.	ATTORNEY DOCKET NO.	CONFIRMATION NO.
11/075,437	08/07/2007	7254621	20423-10036	5116

34415 7590 07/18/2007  
SYMANTEC/ FENWICK  
SILICON VALLEY CENTER  
801 CALIFORNIA STREET  
MOUNTAIN VIEW, CA 94041

### ISSUE NOTIFICATION

The projected patent number and issue date are specified above.

#### **Determination of Patent Term Adjustment under 35 U.S.C. 154 (b)** (application filed on or after May 29, 2000)

The Patent Term Adjustment is 246 day(s). Any patent to issue from the above-identified application will include an indication of the adjustment on the front page.

If a Continued Prosecution Application (CPA) was filed in the above-identified application, the filing date that determines Patent Term Adjustment is the filing date of the most recent CPA.

Applicant will be able to obtain more detailed information by accessing the Patent Application Information Retrieval (PAIR) WEB site (<http://pair.uspto.gov>).

Any questions regarding the Patent Term Extension or Adjustment determination should be directed to the Office of Patent Legal Administration at (571)-272-7702. Questions relating to issue and publication fee payments should be directed to the Customer Service Center of the Office of Patent Publication at (571)-272-4200.

APPLICANT(s) (Please see PAIR WEB site <http://pair.uspto.gov> for additional applicants):

Sandeep Kishan Singhal, Englewood Cliffs, NJ;  
Barry Eliot Levinson, New York, NY;  
Darren Michael Sanders, Nanuet, NY;

AO 120 (Rev. 08/10)

TO: <div>Mail Stop 8 Director of the U.S. Patent and Trademark Office P.O. Box 1450 Alexandria, VA 22313-1450</div>	<div>REPORT ON THE FILING OR DETERMINATION OF AN ACTION REGARDING A PATENT OR TRADEMARK</div>
---	---

In Compliance with 35 U.S.C. § 290 and/or 15 U.S.C. § 1116 you are hereby advised that a court action has been filed in the U.S. District Court \_\_\_\_\_ for the District of Delaware \_\_\_\_\_ on the following  
☐ Trademarks or ☒ Patents. ( ☐ the patent action involves 35 U.S.C. § 292.):

DOCKET NO.	DATE FILED 5/22/2012	U.S. DISTRICT COURT for the District of Delaware
PLAINTIFF STEC IP, LLC		DEFENDANT Apple, Inc.
PATENT OR TRADEMARK NO.	DATE OF PATENT OR TRADEMARK	HOLDER OF PATENT OR TRADEMARK
1 7,032,089	4/18/2006	STEC IP, LLC
2 6,738,799	5/18/2004	STEC IP, LLC
3 5,495,607	2/27/1996	STEC IP, LLC
4 6,925,481	8/2/2005	STEC IP, LLC
5 7,254,621	8/7/2007	STEC IP, LLC

In the above—entitled case, the following patent(s)/ trademark(s) have been included:

DATE INCLUDED	INCLUDED BY <input type="checkbox"/> Amendment <input type="checkbox"/> Answer <input type="checkbox"/> Cross Bill <input checked="" type="checkbox"/> Other Pleading	
PATENT OR TRADEMARK NO.	DATE OF PATENT OR TRADEMARK	HOLDER OF PATENT OR TRADEMARK
1 6,963,908	11/8/2005	STEC IP, LLC
2 5,825,891	10/20/1998	STEC IP, LLC
3		
4		
5		

In the above—entitled case, the following decision has been rendered or judgement issued:

DECISION/JUDGEMENT
--------------------

CLERK	(BY) DEPUTY CLERK	DATE
-------	-------------------	------

Copy 1—Upon initiation of action, mail this copy to Director    Copy 3—Upon termination of action, mail this copy to Director  
Copy 2—Upon filing document adding patent(s), mail this copy to Director    Copy 4—Case file copy



AO-120 (Rev. 08/10)

TO: <b>Mail Stop 8</b> <b>Director of the U.S. Patent and Trademark Office</b> <b>P.O. Box 1450</b> <b>Alexandria, VA 22313-1450</b>	<b>REPORT ON THE</b> <b>FILING OR DETERMINATION OF AN</b> <b>ACTION REGARDING A PATENT OR</b> <b>TRADEMARK</b>
---	---

In Compliance with 35 U.S.C. § 290 and/or 15 U.S.C. § 1116 you are hereby advised that a court action has been  
filed in the U.S. District Court \_\_\_\_\_ for the District of Delaware \_\_\_\_\_ on the following  
☐ Trademarks or ☒ Patents. ( ☐ the patent action involves 35 U.S.C. § 292.);

DOCKET NO.	DATE FILED 5/22/2012	U.S. DISTRICT COURT for the District of Delaware
PLAINTIFF STEC IP, LLC		DEFENDANT GOOGLE, INC.
PATENT OR TRADEMARK NO.	DATE OF PATENT OR TRADEMARK	HOLDER OF PATENT OR TRADEMARK
1 7,596,784	9/29/2009	STEC IP, LLC
2 7,065,637	6/20/2006	STEC IP, LLC
3 7,032,089	4/18/2006	STEC IP, LLC
4 6,738,799	5/18/2004	STEC IP, LLC
5 5,495,607	2/27/1996	STEC IP, LLC

In the above—entitled case, the following patent(s)/ trademark(s) have been included:

DATE INCLUDED	INCLUDED BY <input type="checkbox"/> Amendment <input type="checkbox"/> Answer <input type="checkbox"/> Cross Bill <input checked="" type="checkbox"/> Other Pleading	
PATENT OR TRADEMARK NO.	DATE OF PATENT OR TRADEMARK	HOLDER OF PATENT OR TRADEMARK
1 5,825,891	10/20/1998	STEC IP, LLC
2 6,925,481	8/2/2005	STEC IP, LLC
3 7,254,621	8/7/2007	STEC IP, LLC
4 6,963,908	11/8/2005	STEC IP, LLC
5		

In the above—entitled case, the following decision has been rendered or judgment issued:

DECISION/JUDGEMENT
--------------------

CLERK	(BY) DEPUTY CLERK	DATE
-------	-------------------	------

Copy 1—Upon initiation of action, mail this copy to Director    Copy 3—Upon termination of action, mail this copy to Director  
Copy 2—Upon filing document adding patent(s), mail this copy to Director    Copy 4—Case file copy

AO 120 (Rev. 08/10)

TO: <b>Mail Stop 8</b> <b>Director of the U.S. Patent and Trademark Office</b> <b>P.O. Box 1450</b> <b>Alexandria, VA 22313-1450</b>	<b>REPORT ON THE</b> <b>FILING OR DETERMINATION OF AN</b> <b>ACTION REGARDING A PATENT OR</b> <b>TRADEMARK</b>
---	---

In Compliance with 35 U.S.C. § 290 and/or 15 U.S.C. § 1116 you are hereby advised that a court action has been filed in the U.S. District Court \_\_\_\_\_ for the District of Delaware \_\_\_\_\_ on the following  
☐ Trademarks or ☒ Patents. ( ☐ the patent action involves 35 U.S.C. § 292.);

DOCKET NO.	DATE FILED 5/22/2012	U.S. DISTRICT COURT for the District of Delaware
PLAINTIFF STEC IP, LLC		DEFENDANT AMAZON.COM, INC.
PATENT OR TRADEMARK NO.	DATE OF PATENT OR TRADEMARK	HOLDER OF PATENT OR TRADEMARK
1 7,596,784	9/29/2009	AMAZON.COM, INC.
2 7,065,637	6/20/2006	AMAZON.COM, INC.
3 6,738,799	5/18/2004	AMAZON.COM, INC.
4 5,944,839	8/31/1999	AMAZON.COM, INC.
5 5,825,891	10/20/1998	AMAZON.COM, INC.

In the above—entitled case, the following patent(s)/ trademark(s) have been included:

DATE INCLUDED	INCLUDED BY <input type="checkbox"/> Amendment <input type="checkbox"/> Answer <input type="checkbox"/> Cross Bill <input checked="" type="checkbox"/> Other Pleading	
PATENT OR TRADEMARK NO.	DATE OF PATENT OR TRADEMARK	HOLDER OF PATENT OR TRADEMARK
1 5,495,607	2/27/1996	AMAZON.COM, INC.
2 6,925,481	8/2/2005	AMAZON.COM, INC.
3 7,254,621	8/7/2007	AMAZON.COM, INC.
4 6,631,449	10/7/2003	AMAZON.COM, INC.
5 6,918,014	7/12/2005	AMAZON.COM, INC.

In the above—entitled case, the following decision has been rendered or judgement issued:

DECISION/JUDGEMENT
--------------------

CLERK	(BY) DEPUTY CLERK	DATE
-------	-------------------	------

Copy 1—Upon initiation of action, mail this copy to Director    Copy 3—Upon termination of action, mail this copy to Director  
Copy 2—Upon filing document adding patent(s), mail this copy to Director    Copy 4—Case file copy



AO 120 (Rev. 08/10)

TO: <b>Mail Stop 8</b> <b>Director of the U.S. Patent and Trademark Office</b> <b>P.O. Box 1450</b> <b>Alexandria, VA 22313-1450</b>	<b>REPORT ON THE</b> <b>FILING OR DETERMINATION OF AN</b> <b>ACTION REGARDING A PATENT OR</b> <b>TRADEMARK</b>
---	---

In Compliance with 35 U.S.C. § 290 and/or 15 U.S.C. § 1116 you are hereby advised that a court action has been filed in the U.S. District Court \_\_\_\_\_ for the District of Delaware \_\_\_\_\_ on the following

☐ Trademarks or ☒ Patents. ( ☐ the patent action involves 35 U.S.C. § 292.);

DOCKET NO.	DATE FILED 5/29/2012	U.S. DISTRICT COURT for the District of Delaware
PLAINTIFF CLOUDING IP, LLC		DEFENDANT ROCKSPACE HOSTING, INC.
PATENT OR TRADEMARK NO.	DATE OF PATENT OR TRADEMARK	HOLDER OF PATENT OR TRADEMARK
1 7,596,786	9/29/2009	CLOUDING IP, LLC
2 7,065,637	6/20/2006	CLOUDING IP, LLC
3 6,738,799	5/18/2004	CLOUDING IP, LLC
4 5,495,607	2/27/1996	CLOUDING IP, LLC
5 6,925,481	8/2/2005	CLOUDING IP, LLC

In the above—entitled case, the following patent(s)/ trademark(s) have been included:

DATE INCLUDED	INCLUDED BY <input type="checkbox"/> Amendment <input type="checkbox"/> Answer <input type="checkbox"/> Cross Bill <input checked="" type="checkbox"/> Other Pleading	
PATENT OR TRADEMARK NO.	DATE OF PATENT OR TRADEMARK	HOLDER OF PATENT OR TRADEMARK
1 7,254,621	8/7/2007	CLOUDING IP, LLC
2 6,963,908	11/8/2005	CLOUDING IP, LLC
3 6,631,449	10/7/2003	CLOUDING IP, LLC
4 6,918,014	7/12/2005	CLOUDING IP, LLC
5		

In the above—entitled case, the following decision has been rendered or judgement issued:

DECISION/JUDGEMENT
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CLERK	(BY) DEPUTY CLERK	DATE
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Copy 1—Upon initiation of action, mail this copy to Director    Copy 3—Upon termination of action, mail this copy to Director  
Copy 2—Upon filing document adding patent(s), mail this copy to Director    Copy 4—Case file copy



**PATENT APPLICATION FEE DETERMINATION RECORD**  
Effective December 8, 2004

11075437

**CLAIMS AS FILED - PART I**

(Column 1) (Column 2)

TOTAL CLAIMS	24	
FOR	NUMBER FILED	NUMBER EXTRA
TOTAL CHARGEABLE CLAIMS	24 minus 20 =	* 4
INDEPENDENT CLAIMS	3 minus 3 =	* 0
MULTIPLE DEPENDENT CLAIM PRESENT <input type="checkbox"/>		

\* If the difference in column 1 is less than zero, enter "0" in column 2

**CLAIMS AS AMENDED - PART II**

(Column 1) (Column 2) (Column 3)

AMENDMENT A		CLAIMS REMAINING AFTER AMENDMENT		HIGHEST NUMBER PREVIOUSLY PAID FOR	PRESENT EXTRA
	Total	*	Minus	**	=
	Independent	*	Minus	***	=
	FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM <input type="checkbox"/>				

SMALL ENTITY TYPE ☐ OR

OTHER THAN SMALL ENTITY

RATE	FEE
BASIC FEE	150.00
X\$ 25=	
X100=	
+180=	
TOTAL	

RATE	FEE
BASIC FEE	300.00
X\$50=	
X200=	
+360=	
TOTAL	

SMALL ENTITY OR

OTHER THAN SMALL ENTITY

RATE	ADDITIONAL FEE
X\$ 25=	
X100=	
+180=	
TOTAL ADDIT. FEE	

RATE	ADDITIONAL FEE
X\$50=	
X200=	
+360=	
TOTAL ADDIT. FEE	

(Column 1) (Column 2) (Column 3)

AMENDMENT B		CLAIMS REMAINING AFTER AMENDMENT		HIGHEST NUMBER PREVIOUSLY PAID FOR	PRESENT EXTRA
	Total	*	Minus	**	=
	Independent	*	Minus	***	=
	FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM <input type="checkbox"/>				

RATE	ADDITIONAL FEE
X\$ 25=	
X100=	
+180=	
TOTAL ADDIT. FEE	

RATE	ADDITIONAL FEE
X\$50=	
X200=	
+360=	
TOTAL ADDIT. FEE	

(Column 1) (Column 2) (Column 3)

AMENDMENT C		CLAIMS REMAINING AFTER AMENDMENT		HIGHEST NUMBER PREVIOUSLY PAID FOR	PRESENT EXTRA
	Total	*	Minus	**	=
	Independent	*	Minus	***	=
	FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM <input type="checkbox"/>				

RATE	ADDITIONAL FEE
X\$ 25=	
X100=	
+180=	
TOTAL ADDIT. FEE	

RATE	ADDITIONAL FEE
X\$50=	
X200=	
+360=	
TOTAL ADDIT. FEE	

\* If the entry in column 1 is less than the entry in column 2, write "0" in column 3.

\*\* If the "Highest Number Previously Paid For" IN THIS SPACE is less than 20, enter "20."

\*\*\* If the "Highest Number Previously Paid For" IN THIS SPACE is less than 3, enter "3."

The "Highest Number Previously Paid For" (Total or Independent) is the highest number found in the appropriate box in column 1.

# MPI Family Report (Family Bibliographic and Legal Status)

In the MPI Family report, all publication stages are collapsed into a single record, based on identical application data. The bibliographic information displayed in the collapsed record is taken from the latest publication.

**Report Created Date:** 2012-07-12

**Name of Report:**

**Number of Families:** 1

**Comments:**

## Table of Contents

1.	<a href="#">US7254621B2</a>	20070807	SYMANTEC CORP	US	
	Technique for enabling remote data access and manipulation from a pervasive device .....				1



## Family1

**4 records in the family, collapsed to 2 records.**

**US7254621B2 20070807**  
**US2005216492A1 20050929**

**(ENG) Technique for enabling remote data access and manipulation from a pervasive device**

**Assignee:** SYMANTEC CORP US

**Inventor(s):** SINGHAL SANDEEP KISHAN US ; LEVINSON  
BARRY ELIOT US ; SANDERS DARREN  
MICHAEL US

**Application No:** US 7543705 A

**Filing Date:** 20050307

**Issue/Publication Date:** 20070807

**Abstract:** (ENG) Methods, systems, and computer program instructions for enabling users of pervasive devices to remotely access and manipulate information in ways that might otherwise be impossible or impractical because of inherent limitations of the device. The disclosed techniques enable a wide variety of data manipulation operations to be performed on behalf of the pervasive device, for a wide variety of content types. In preferred embodiments, no modifications or add-ons are required to the pervasive device.

**Priority Data:** US 7543705 20050307 A N; US 84839401 20010503 A 1 Y;

**Related Application(s):** 11/075437 20050307 20050216492 US; 09/848394 20010503 6925481 US

**IPC (International Class):** G06F01516; H04L02906; H04L02908

**ECLA (European Class):** H04L02908N27E; H04L02906; H04L02908N5; H04L02908N27

**US Class:** 709218; 709217

**Publication Language:** ENG

**Filing Language:** ENG

**Agent(s):** Fenwick & West LLP

**Examiner Primary:** Meky, Moustafa M.

### Assignments Reported to USPTO:

**Reel/Frame:** 28271/0971 **Date Signed:** 20120228 **Date Recorded:** 20120525

**Assignee:** STEC IP, LLC 2 TERRACE WAY STE. C GREENSBORO NORTH CAROLINA 27403

**Assignor:** SYMANTEC

**Corres. Addr:** TAREK N. FAHMI, APC 84W. SANTA CLARA ST., SUITE 550 SAN JOSE, CA 95113

**Brief:** ASSIGNMENT OF ASSIGNORS INTEREST (SEE DOCUMENT FOR DETAILS).

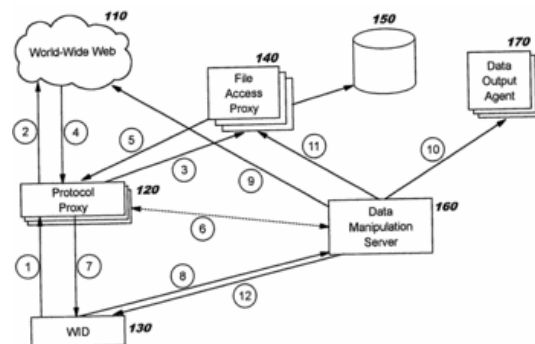
**Reel/Frame:** 28275/0896 **Date Signed:** 20120524 **Date Recorded:** 20120525

**Assignee:** CLOUDING IP, LLC 2 TERRACE WAY STE. C GREENSBORO NORTH CAROLINA 27403

**Assignor:** STEC IP, LLC

**Corres. Addr:** TAREK N. FAHMI, APC 84 W. SANTA CLARA ST., SUITE 550 SAN JOSE, CA 95113

**Brief:** CHANGE OF NAME (SEE DOCUMENT FOR DETAILS).



**Legal Status:**

Date	+/-	Code	Description
20110207	()	FPAY	Year of fee payment: 4;

**US6925481B2 20050802**  
**US2002178211A1 20021128**

**(ENG) Technique for enabling remote data access and manipulation from a pervasive device**

**Assignee:** SYMANTEC CORP US

**Inventor(s):** SINGHAL SANDEEP KISHAN US ; LEVINSON BARRY ELIOT US ; SANDERS DARREN MICHAEL US

**Application No:** US 84839401 A

**Filing Date:** 20010503

**Issue/Publication Date:** 20050802

**Abstract:** (ENG) Methods, systems, and computer program instructions for enabling users of pervasive devices to remotely access and manipulate information in ways that might otherwise be impossible or impractical because of inherent limitations of the device. The disclosed techniques enable a wide variety of data manipulation operations to be performed on behalf of the pervasive device, for a wide variety of content types. In preferred embodiments, no modifications or add-ons are required to the pervasive device.

**Priority Data:** US 84839401 20010503 A Y;

**IPC (International Class):** H04L02908; H04L02906

**ECLA (European Class):** H04L02908N27E; H04L02906; H04L02908N5; H04L02908N27

**US Class:** 709200; 709203; 709217; 709219

**Publication Language:** ENG

**Filing Language:** ENG

**Agent(s):** Doubet, Marcia L.

**Examiner Primary:** Meky, Moustafa M.

**Assignments Reported to USPTO:**

**Reel/Frame:** 11779/0130 **Date Signed:** 20010503 **Date Recorded:** 20010503

**Assignee:** REEFEDGE, INC. 2 EXECUTIVE DRIVE, SUITE 600 FORT LEE NEW JERSEY 07024

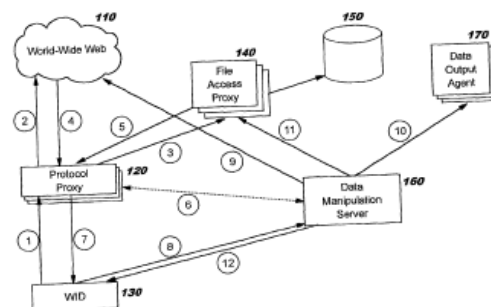
**Assignor:** SINGHAL, SANDEEP K.; LEVINSON, BARRY E.; SANDERS, DARREN M.

**Corres. Addr:** LAW OFFICE OF MARCIA L. DOUBET MARCIA L. DOUBET 5228 WESTMINSTER LANE FUQUAY-VARINA, NC 27526

**Brief:** ASSIGNMENT OF ASSIGNORS INTEREST (SEEDOCUMENT FOR DETAILS).

**Reel/Frame:** 12471/0289 **Date Signed:** 20010503 **Date Recorded:** 20020111

**Assignee:** REEFEDGE, INC., A CORPORATION OF DELAWARE 2 EXECUTIVE DRIVE, SUITE 600 FORT LEE NEW JERSEY 07024



**Assignor:** SINGHAL, SANDEEP K.; LEVINSON, BARRY E.; SANDERS, DARREN M.

**Corres. Addr:** LAW OFFICE OF MARCIA L. DOUBET MARCIA L. DOUBET 5228 WESTMINSTER  
LANE FUQUAY-VARINA, NC 27526

**Brief:** CORRECTIVEASSIGNMENT TO CORRECT THE TITLE IN THE BODY OF THE  
ASSIGNMENT DOCUMENT ON REEL 011779 FRAME 0130.

**Reel/Frame:** 14378/0225 **Date Signed:** 20030720 **Date Recorded:** 20030814

**Assignee:** REEFEDGE, INC., A CORPORATION OF DELAWARE 2 EXECUTIVE DRIVE, SUITE 600  
FORT LEE NEW JERSEY07024

**Assignor:** SINGHAL, SANDEEP KISHAN; LEVINSON, BARRY ELIOT; SANDERS, DARREN MICHAEL  
MICHAEL

**Corres. Addr:** MARCIA L. DOUBET PO BOX 422859 KISSIMMEE, FL 34742-2859

**Brief:** AMENDMENT TO PRIOR ASSIGNMENT

**Reel/Frame:** 14327/0892 **Date Signed:** 20031215 **Date Recorded:** 20040212

**Assignee:** SILICON VALLEY BANK DBA SILICON VALLEY EAST 3003 TASMAN DRIVE SANTA  
CLARA CALIFORNIA 95054

**Assignor:** REEFEDGE, INC.

**Corres. Addr:** CHRISTOPHER E. KONDRACKI 2001 JEFFERSON DAVIS, HWY. SUITE 505  
ARLINGTON, VA 22202

**Brief:** SECURITY AGREEMENT

**Reel/Frame:** 15698/0943 **Date Signed:** 20050128 **Date Recorded:** 20050210

**Assignee:** SYMANTEC CORPORATION 20330 STEVENS CREEK BLVD. CUPERTINO CALIFORNIA  
95014 SYMANTECINTERNATIONAL LIMITED BALLYCOOLIN BUSINESS PARK  
BLANCHARDSTOWN, DUBLIN 15 IRELAND

**Assignor:** REEFEDGE, INC.

**Corres. Addr:** FENWICK & WEST LLP BRIAN M. HOFFMANSILICON VALLEY CENTER 801  
CALIFORNIA STREET MOUNTAIN VIEW, CA 94041

**Brief:** ASSIGNMENT OF ASSIGNORS INTEREST (SEE DOCUMENT FORDETAILS).

**Reel/Frame:** 15722/0797 **Date Signed:** 20050215 **Date Recorded:** 20050216

**Assignee:** SYMANTEC CORPORATION 20330 STEVENS CREEK BLVD. CUPERTINO CALIFORNIA  
95014

**Assignor:** SYMANTEC INTERNATIONAL LIMITED

**Corres. Addr:** FENWICK & WESTLLP BRIAN M. HOFFMAN, ESQ. SILICON VALLEY CENTER 801  
CALIFORNIA STREET MOUNTAIN VIEW, CA 94041

**Brief:** ASSIGNMENT OF ASSIGNORSINTEREST (SEE DOCUMENT FOR DETAILS).

**Reel/Frame:** 28271/0971 **Date Signed:** 20120228 **Date Recorded:** 20120525

**Assignee:** STEC IP, LLC 2 TERRACE WAY STE. C GREENSBORO NORTH CAROLINA 27403

**Assignor:** SYMANTEC

**Corres. Addr:** TAREK N. FAHMI, APC 84W. SANTA CLARA ST., SUITE 550 SAN JOSE, CA 95113

**Brief:** ASSIGNMENT OF ASSIGNORS INTEREST (SEE DOCUMENT FOR DETAILS).

**Reel/Frame:** 28275/0896 **Date Signed:** 20120524 **Date Recorded:** 20120525



**Assignee:** CLOUDING IP, LLC 2 TERRACE WAY STE. C GREENSBORO NORTH CAROLINA 27403

**Assignor:** STEC IP, LLC

**Corres. Addr:** TAREK N. FAHMI, APC 84 W. SANTA CLARA ST., SUITE 550 SAN JOSE, CA 95113

**Brief:** CHANGE OF NAME (SEE DOCUMENT FOR DETAILS).

**Legal Status:**

<b>Date</b>	<b>+/-</b>	<b>Code</b>	<b>Description</b>
20010503	()	AS	New owner name: REEFEDGE, INC., NEW JERSEY; : ASSIGNMENT OF ASSIGNORS INTEREST;ASSIGNORS:SINGHAL, SANDEEP K.;LEVINSON, BARRY E.;SANDERS, DARREN M.;REEL/FRAME:011779/0130; Effective date: 20010503;
20020111	()	AS	New owner name: REEFEDGE, INC., A CORPORATION OF DELAWARE, NEW JER; : CORRECTIVE ASSIGNMENT TO CORRECT THE TITLE IN THE BODY OF THE ASSIGNMENT DOCUMENT ON REEL 011779 FRAME 0130;ASSIGNORS:SINGHAL, SANDEEP K.;LEVINSON, BARRY E.;SANDERS, DARREN M.;REEL/FRAME:012471/0289; Effective date: 20010503;
20030814	()	AS	New owner name: REEFEDGE, INC., A CORPORATION OF DELAWARE, NEW JER; : AMENDMENT TO PRIOR ASSIGNMENT;ASSIGNORS:SINGHAL, SANDEEP KISHAN;LEVINSON, BARRY ELIOT;SANDERS, DARREN MICHAEL;REEL/FRAME:014378/0225;SIGNING DATES FROM 20030720 TO 20030721;
20040212	()	AS	ASSIGNMENT New owner name: SILICON VALLEY BANK DBA SILICON VALLEY EAST 3003 T; : SECURITY AGREEMENT;ASSIGNOR:REEFEDGE, INC. /AR;REEL/FRAME:014327/0892; Effective date: 20031215;
20040212	()	AS	New owner name: SILICON VALLEY BANK DBA SILICON VALLEY EAST, CALIF; : SECURITY AGREEMENT;ASSIGNOR:REEFEDGE, INC.;REEL/FRAME:014327/0892; Effective date: 20031215;
20040212	()	AS	New owner name: SILICON VALLEY BANK DBA SILICON VALLEY EAST 3003 T; : SECURITY AGREEMENT;ASSIGNOR:REEFEDGE, INC. /AR;REEL/FRAME:014327/0892; Effective date: 20031215;
20050210	()	AS	ASSIGNMENT New owner name: SYMANTEC CORPORATION 20330 STEVENS CREEK BLVD.CUPE; : ASSIGNMENT OF ASSIGNORS INTEREST;ASSIGNOR:REEFEDGE, INC. /AR;REEL/FRAME:015698/0943; Effective date: 20050128;
20050210	()	AS	New owner name: SYMANTEC CORPORATION, CALIFORNIA; : ASSIGNMENT OF ASSIGNORS INTEREST;ASSIGNOR:REEFEDGE, INC.;REEL/FRAME:015698/0943; Effective date: 20050128;
20050210	()	AS	New owner name: SYMANTEC INTERNATIONAL LIMITED, IRELAND; : ASSIGNMENT OF ASSIGNORS INTEREST;ASSIGNOR:REEFEDGE, INC.;REEL/FRAME:015698/0943; Effective date: 20050128;
20050210	()	AS	New owner name: SYMANTEC CORPORATION 20330



---

20050216	( )	AS	STEVENS CREEK BLVD.CUPE; : ASSIGNMENT OF ASSIGNORS INTEREST;ASSIGNOR:REEFEDGE, INC. /AR;REEL/FRAME:015698/0943; Effective date: 20050128; ASSIGNMENT New owner name: SYMANTEC CORPORATION 20330 STEVENS CREEK BLVD.CUPE; : ASSIGNMENT OF ASSIGNORS INTEREST;ASSIGNOR:SYMANTEC INTERNATIONAL LIMITED /AR;REEL/FRAME:015722/0797; Effective date: 20050215;
20050216	( )	AS	New owner name: SYMANTEC CORPORATION, CALIFORNIA; : ASSIGNMENT OF ASSIGNORS INTEREST;ASSIGNOR:SYMANTEC INTERNATIONAL LIMITED;REEL/FRAME:015722/0797; Effective date: 20050215;
20050216	( )	AS	New owner name: SYMANTEC CORPORATION 20330 STEVENS CREEK BLVD.CUPE; : ASSIGNMENT OF ASSIGNORS INTEREST;ASSIGNOR:SYMANTEC INTERNATIONAL LIMITED /AR;REEL/FRAME:015722/0797; Effective date: 20050215;
20090202	( )	FPAY	Year of fee payment: 4;

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USPTO Maintenance Report					
Patent Bibliographic Data			07/12/2012 10:00 AM		
Patent Number:	7254621		Application Number:	11075437	
Issue Date:	08/07/2007		Filing Date:	03/07/2005	
Title:	TECHNIQUE FOR ENABLING REMOTE DATA ACCESS AND MANIPULATION FROM A PERV				
Status:	8th year fee window opens: 08/07/2014			Entity:	Large
Window Opens:	08/07/2014	Surcharge Date:	02/10/2015	Expiration:	N/A
Fee Amt Due:	Window not open	Surchg Amt Due:	Window not open	Total Amt Due:	Window not open
Fee Code:	1552	MAINTENANCE FEE DUE AT 7.5 YEARS			
Surcharge Fee Code:					
Most recent events (up to 7):	02/07/2011	Payment of Maintenance Fee, 4th Year, Large Entity. --- End of Maintenance History ---			
Address for fee purposes:	SYMANTEC/ FENWICK SILICON VALLEY CENTER 801 CALIFORNIA STREET MOUNTAIN VIEW CA 94041				