

Command & Control Internet Transport "CCIT"™

Connecting people and things™



Command & Control Internet Transport (“CCIT”) technology

CCIT enables Internet appliance and smart device management systems to control targeted information delivery to, data retrieval from, and instruction execution on distributed smart devices, all in an encrypted environment. Using PC's, hand-held, and wireless devices, CCIT further enables any group of device managers to safely and securely interact simultaneously and independently with widely dispersed smart devices deployed on a large scale. Each device manager is carefully controlled and monitored with regard to the type of device access and activity they are granted. Examples of smart devices include network-connected gasoline pumps, vending machines, servers, and Internet appliances.

In short, *CCIT connects people and things!*

Background

The idea for CCIT was born out of a study of the off-premise Web hosting business (providing space on a commercial Web server to a customer for its Web site.). Off-premise Web hosting is provided by a wide range of Internet Service Providers (“ISPs”) and other specialty business service companies. A major problem with most off-premise Web sites is that content revision either requires technical training or expensive updates through the site-design company or through the Web hosting service. The result is that many firms find it too expensive, untimely or cumbersome to keep their Web content fresh.

Industry overview

Content management is fast becoming one of the most serious problems facing all web sites. Now that we're on the Web, how do we keep content fresh? How do we manage content? How do we protect the integrity of our site?

The answers to these questions from the software industry have thus far been limited. "(the software industry) hasn't yet taken content-creation tools seriously," said Harley Manning, an analyst at Forrester Research, in Cambridge, Mass., in the Sept. 20, 1999 issue of INFOWORLD. "They need to start getting involved and thinking about an overall content-creation and management strategy."

Laura Kujubu, author of the same article stated, "As corporations' Web sites become more integral to business operations, the number of non-technical content contributors is quickly surpassing that of technical participants."

A product needed to be developed to be an answer to the following question: "How can we enable non-technical contributors to *easily and safely* manage web site content *directly* without having to grant them hi-level server access and without having to train them to be web publishers?"

Inappropriate solutions

Upon close examination of all Internet transfer protocols, the one most commonly used for web content management is File Transfer Protocol ("FTP"). [To a lesser extent Hypertext Transfer Protocol ("HTTP"), which utilizes browser or other client-accessed scripts/templates, is sometimes used by site developers for their customer's specific needs. Both protocols require direct access to the web server. Local Area Network ("LAN") access to on-premise web documents is sometimes granted as well.]

These approaches all lack many critical "access control" requirements if the goals are to:

- decentralize content management
- enable subordinated non-technical contributors to utilize existing content editors and skills
- enable contributors to easily and safely deliver information to the web site
- provide live monitoring and automatic reporting of all activity

File Transfer Protocol (FTP)

FTP was developed in the early days of the Internet for use by senior technical people with advanced programming skills and with high-level sever access authority. FTP was never envisioned as a means to delegate content management to subordinate and non-technical contributors and therefore, the protocol has no provisions to tightly control server access, limit the types of activities that can be conducted, and provide live monitoring. For lack of a better method, many Web publishing products are based on FTP. Many of these products are actually fully functional site development tools rather than content management tools, and are intended for use by Webmasters (people with advanced web publishing skills and web server access authority). All FTP-based products are deficient in their lack of satisfactory server access control and their lack of content control. For example, contributors cannot be prevented from uploading unauthorized pages. They must also be granted "full page" authoring privileges and cannot be restricted to specified areas within a page. Additionally, FTP protocol does not provide for live monitoring and reporting of server activity.

Databases

With database-driven solutions, web pages can be partitioned thus restricting contributors to specified areas, but the web server software must be replaced and the entire web site must be re-engineered around a database. Because

database-driven solutions are extremely complex to deploy and cumbersome to use, they are expensive to purchase and install. In addition, database-driven web pages must be created "on the fly" making them slower to load and more wasteful of server bandwidth. For purposes of content management, doing so via a database is taking a circuitous route. For the millions of existing web sites desiring a retrofitable solution, this is a prohibitively expensive and unacceptable approach.

Command and Control Internet Transport (CCIT) technology

After a review of existing technologies and protocols revealed that no satisfactory solution currently existed, development began on an revolutionary Internet technology that would be highly leverageable by:

- lowering implementation costs
- increasing productivity by delegating and automating command and information exchange
- remaining platform independent
- providing secure solutions
- maintaining compatibility with existing network protocols
- accomplishing the above without a need for dramatic retooling of software and hardware

This technology would become known as Command and Control Internet Transport ("CCIT") technology.

CCIT leverages mail transfer protocol

Reedy Creek determined that processes such as Simple Mail Transfer Protocol ("SMTP"), Post Office Protocol ("POP"), and Messaging Application Programming Interface ("MAPI") most nearly offered the properties needed in order to meet the above design objectives. After all, thanks to SMTP electronic mail is the "killer app" of the Internet. *No other single transfer protocol is so pervasive in its widespread use across so many devices!* However, no SMTP or MAPI-based web management solutions were known to exist, most likely because these processes were originally envisioned as electronic message delivery mediums and by themselves, did not fulfill traditional web publishing approaches.

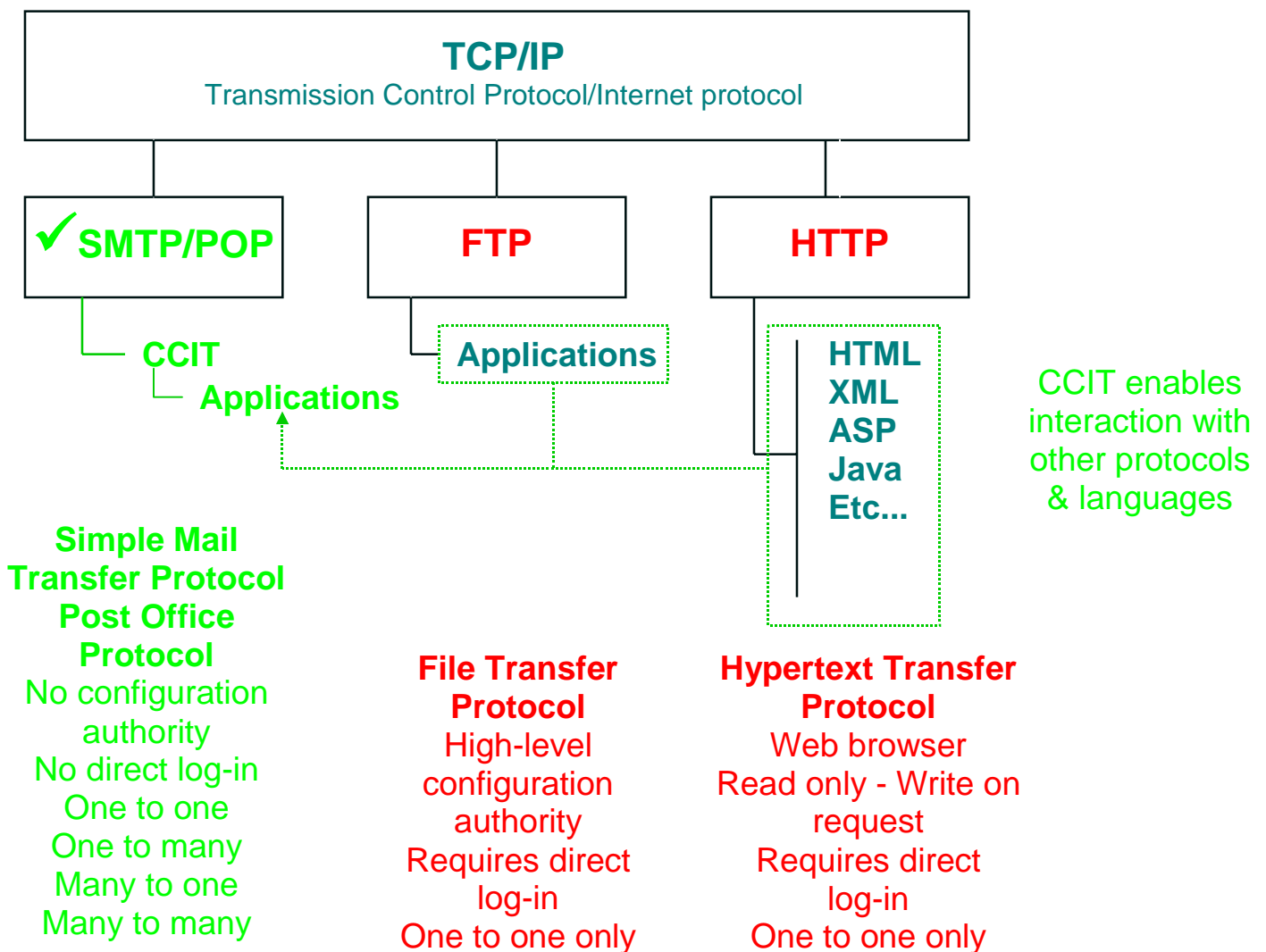
Why SMTP?

Mail transfer protocol enables numerous advantages to be realized:

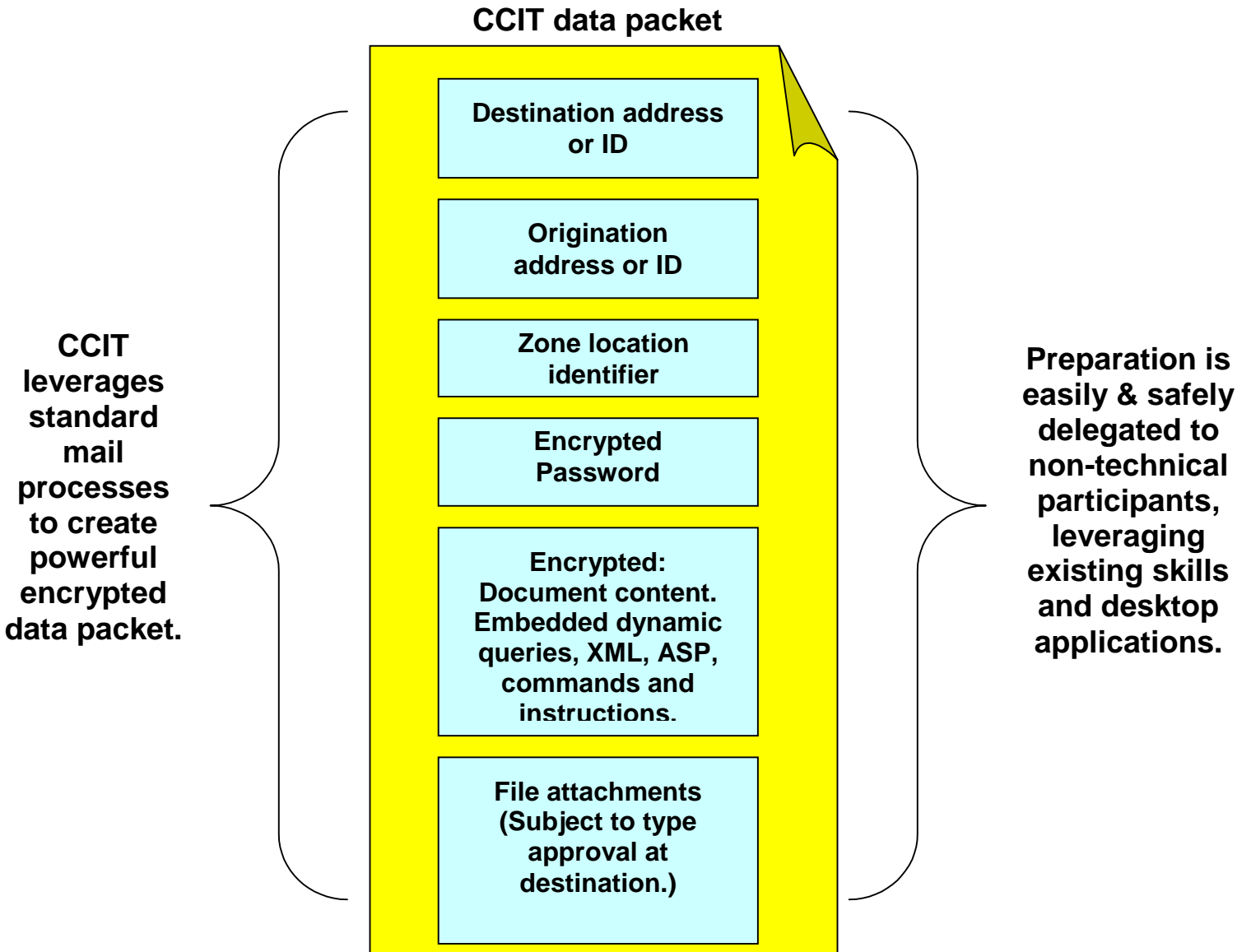
- Enables any mix of "one to one", "one to many", and "many to many" information exchange.
- Eliminates the need for a direct connection to the web server or other remote device thus avoiding many security concerns.
- Enables automated, batched uploads and downloads that were previously prepared offline.
- Eliminates need for continuous online connection at client, server or other remote device.

- Easily configured to transport “instruction sets” and “data packets”.
- Enables automatic file attachment.
- Enables easy transfer of information and collaboration among contributors.
- Easily integrated into specialized applications and processes.
- Leverages growing preponderance of email-enabled devices.
- Avoids unnecessary overhead (browser interfaces, JAVA, XML, databases, run-time processes, etc.).
- SMTP’s universal header structure and independent fields can be easily adapted to interact with servers and remote devices.
- Easily managed bi-directional process (sends and receives).
- Easily encrypted.
- Cost efficient

It's the underlying protocol that makes CCIT advantageous

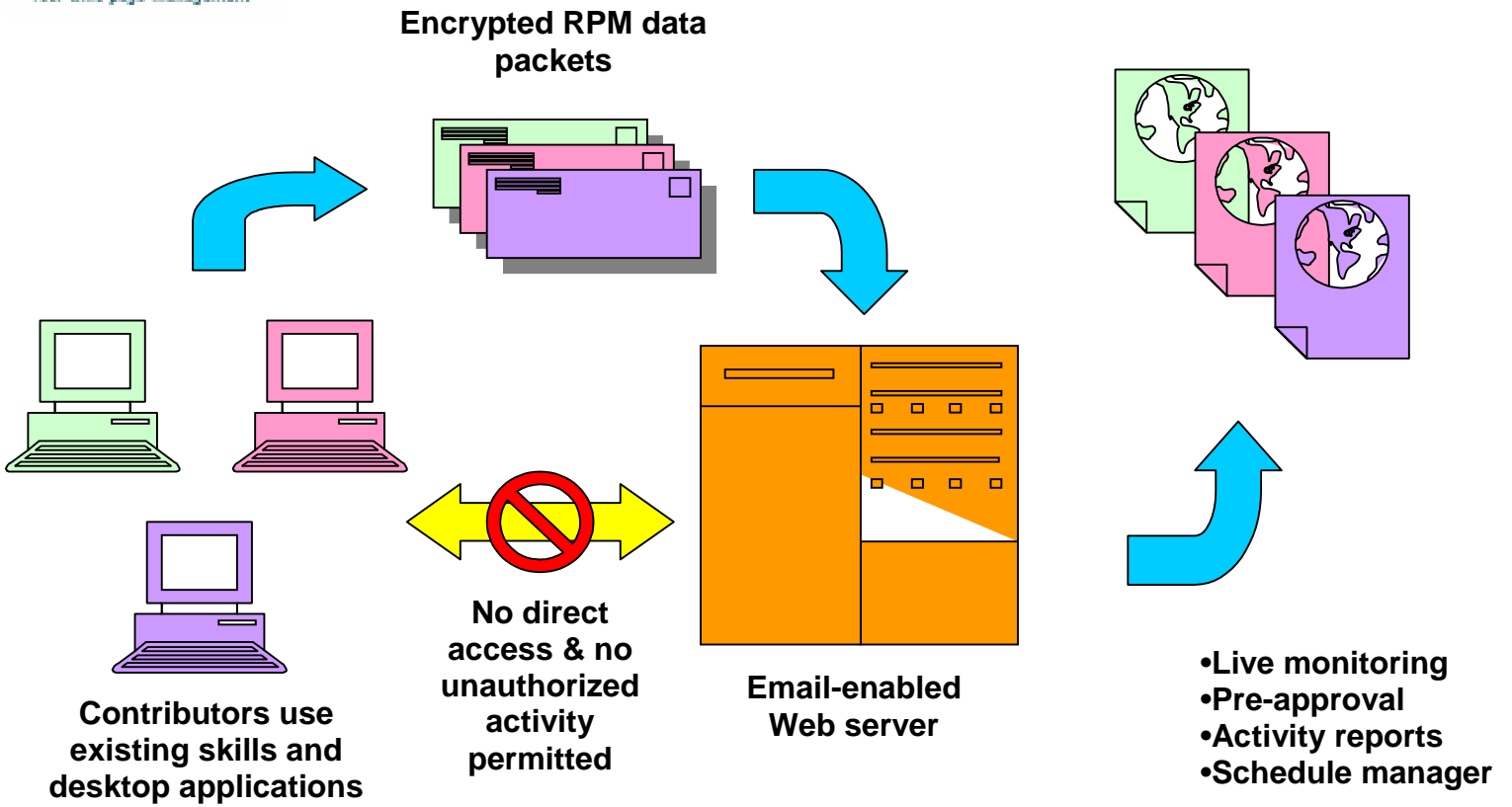


CCIT successfully leverages SMTP, POP, and MAPI by further integrating the additional properties needed in order to accomplish a comprehensive "open-architecture" command and control mechanism. The result is an extremely eloquent technology that can be easily integrated into many scenarios.

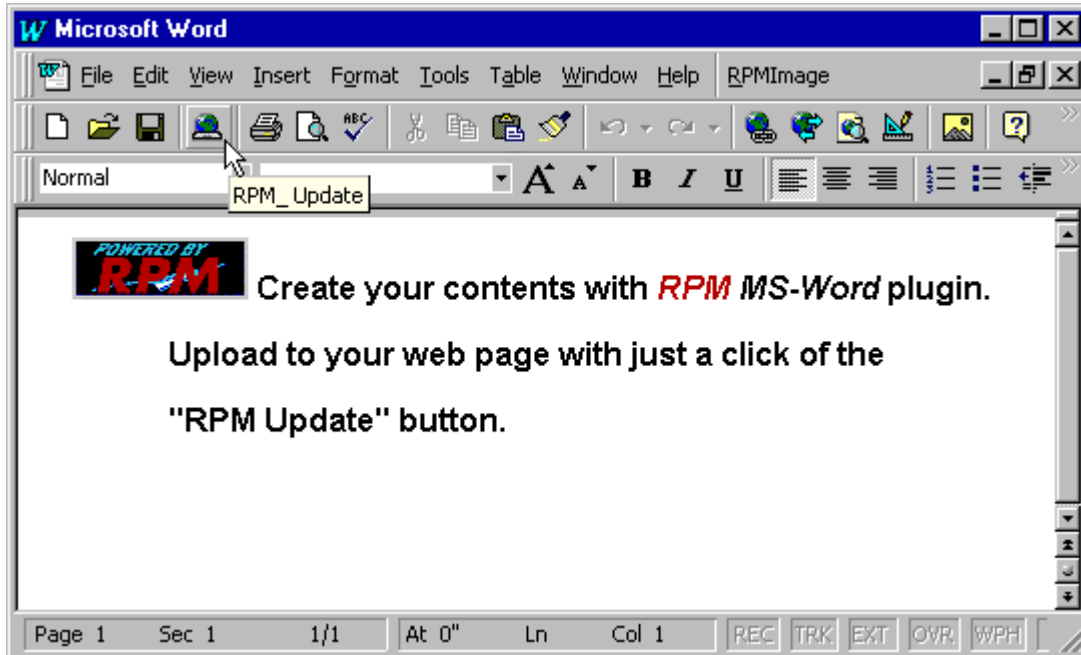


CCIT used in Real-time Page Management

Reedy Creek's initial CCIT application is a web content management solution called **Real-time Page Management ("RPM")**[®].



Numerous client-side plug-ins have also been developed that bundle RPM's email functionality directly into many popular desktop applications such as MS Word, FrontPage, WordPerfect, and HomeSite. The following is a screen shot of the MS Word '97 plug-in showing the "RPM Update" button that is added to the existing Word toolbar. Note that an RPM plug-in is also available for MS Word 2000:



When the contributor is ready to upload his or her page revisions, the "RPM Update" button is clicked, bringing up the following screen:

A screenshot of the "RPM" dialog box. The title bar is "RPM" with a close button. The dialog contains several input fields and buttons. The "To:" field is filled with "rpm@reedycreek.com" and has a "Setup" button to its right. The "From:" field is filled with "Your Name <yourname@yourdomain.com>". The "Zone:" field is empty and has an "Image" button to its right. The "Password:" field is filled with "*****" and has an "Attach" button to its right. Below the password field are two checkboxes: "RPM Zone is Whole Page" and "Encode Message", both of which are unchecked. At the bottom of the dialog are three buttons: "SEND", "CANCEL", and "HELP".

The **To:** field identifies the email address to the web server that was established for RPM mail.

The **From:** field contains the email address of the contributor.

The **Zone:** field contains the ID that is assigned to this "page access zone" by the webmaster.

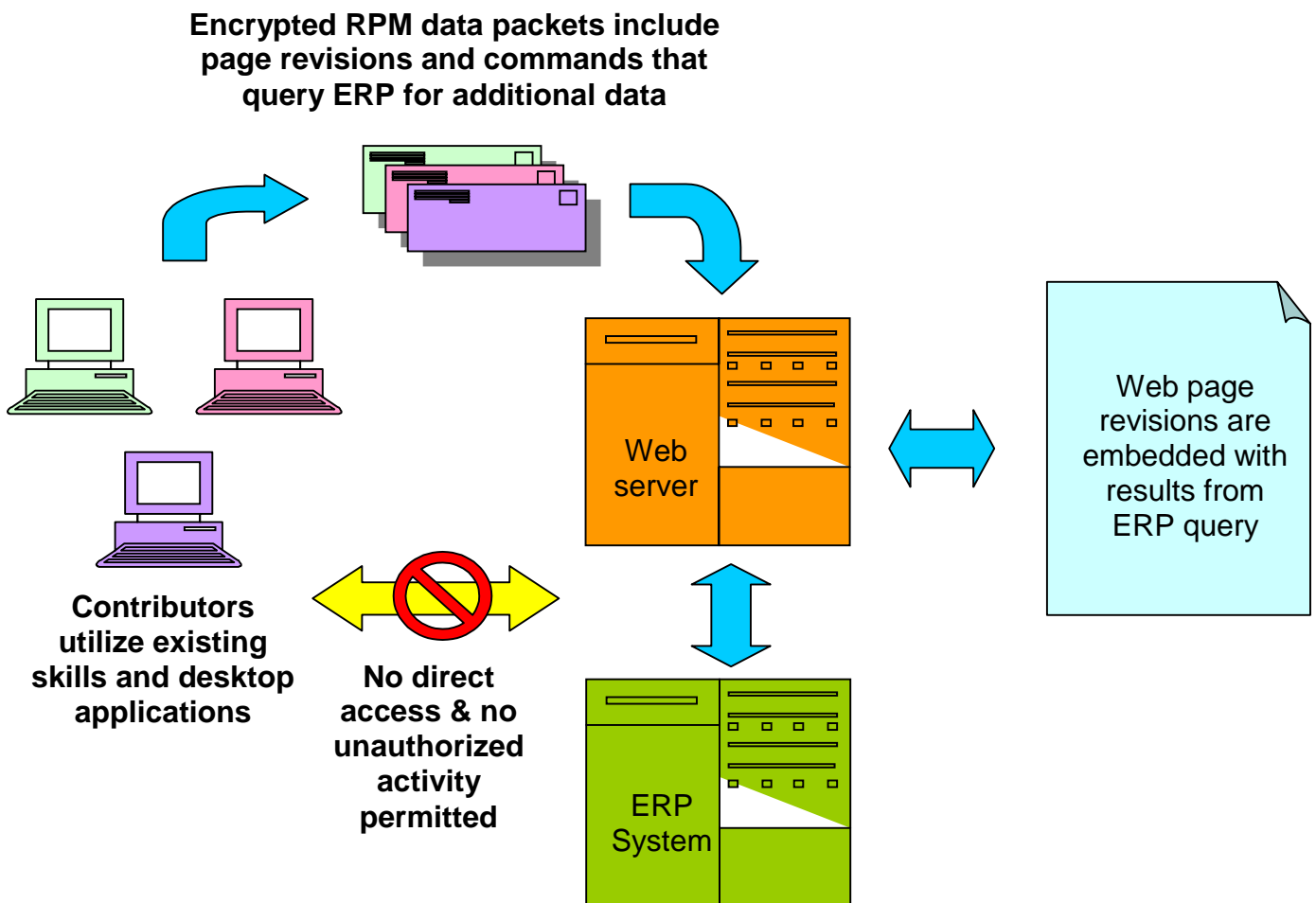
The **Password:** field contains the password that is assigned to this contributor by the webmaster.

By clicking the **SEND** button, the contents of the Word document are converted to HTML and placed in the "body" of the mail document. Unneeded tags are stripped away when the revisions are to be incorporated into a template web page, and image files are automatically attached to the specially configured mail document. If desired, the mail document can be encrypted using CCIT's proprietary algorithm.

Embedded Content

CCIT technology also enables powerful and unique functionalities to be designed into specialized applications. For instance, in addition to revisions to web page contents, the "body" of the email document could also contain user-defined "tags". These tags would be detected by RPM at the server to trigger any command that has been previously established in the configuration file associated with that particular zone or "port". The server can be instructed, for example, to query a database and embed the results within the web page revisions wherever the contributor desires.

In another example, if a regional sales manager for a large company wishes to publish a sales report on the company Intranet, he or she can create the narrative for the report, embed a command tag to run a pre-programmed query of the enterprise server for a sales summary, combine the results with the narrative, and publish the resulting document to the Intranet.



This "command and control" capability enables unlimited possibilities not only for content management, but also for future remote device control applications.

Beyond Web Pages

Although the initial motive was to develop a powerful web content management solution, Reedy Creek quickly realized that CCIT had broad application far beyond that of web content management.

A patent application was filed in May, 1997, within the one-year grace period of RPM's first public showing. In 1999, 28 months after filing, Reedy Creek received patent #5,937,160 which includes 45 claims that encompass the use of electronic mail to perform a variety of tasks including:

- sending information and commands to servers, ERP systems, and remote devices
- retrieving information from servers, ERP systems, and remote devices
- zoned web content management
- embedding web content with dynamic information

As information technology moves away from the PC, it is shifting towards non-PC "smart devices" ranging from equipment in industrial plants and factories, to point-of-sale devices (vending machines, kiosks, gasoline pumps, etc.) and consumer appliances. Analyst estimates for the size of the embedded software and services industry and connected non-PC smart devices range from \$1.75 billion by 2003 to \$3 trillion in 2005 (vs. only \$460 billion for the PC).

With the growing proliferation of email-enabled Internet devices, CCIT offers a powerful means to provide *tightly controlled and cost-effective distributed management* of information and systems.

Command & Control

In addition to web page management, specialized applications using CCIT technology can be developed for practically any purpose. Although the following screen shot is taken from RPM's administrative module, it serves to illustrate how easily "command and control" functions can be configured and deployed:

The screenshot shows a configuration form with the following fields and values:

- Enter the SUBJECT/ZONE name (rpmtest):**
- Enter the HTML file name (rpmtest.html) or Enter the Command (activate.exe):**
- Enter Password:**
- Enter Password Again:**
- Enter the complete Directory path where the RPM Template Document or Command will reside (/home/httpd/rpmtemplates/):**
- Enter the complete Directory path where the final RPM Document will reside (/home/httpd/htdocs/):**
- Enter the RPM tag to be replaced by incoming revisions (<RPM>, <RPM2>):**
- Enter the zone action (single, multi, command, embsingle, embmulti) Place an asterisk * in front of the action to accept encrypted messages only (*single, *multi, *command, *embsingle, *embmulti):**

At the bottom of the form is a button labeled "Click Here To Add Zone".

In the illustration above, a home security system could be activated remotely from any email-enabled device. A configuration file similar to the one above could be set up by an authorized network administrator to enable subordinated non-technical users to trigger any number of complex commands without having to grant them hi-level access to the network and without requiring the user to become involved with system programming or other technical activities.

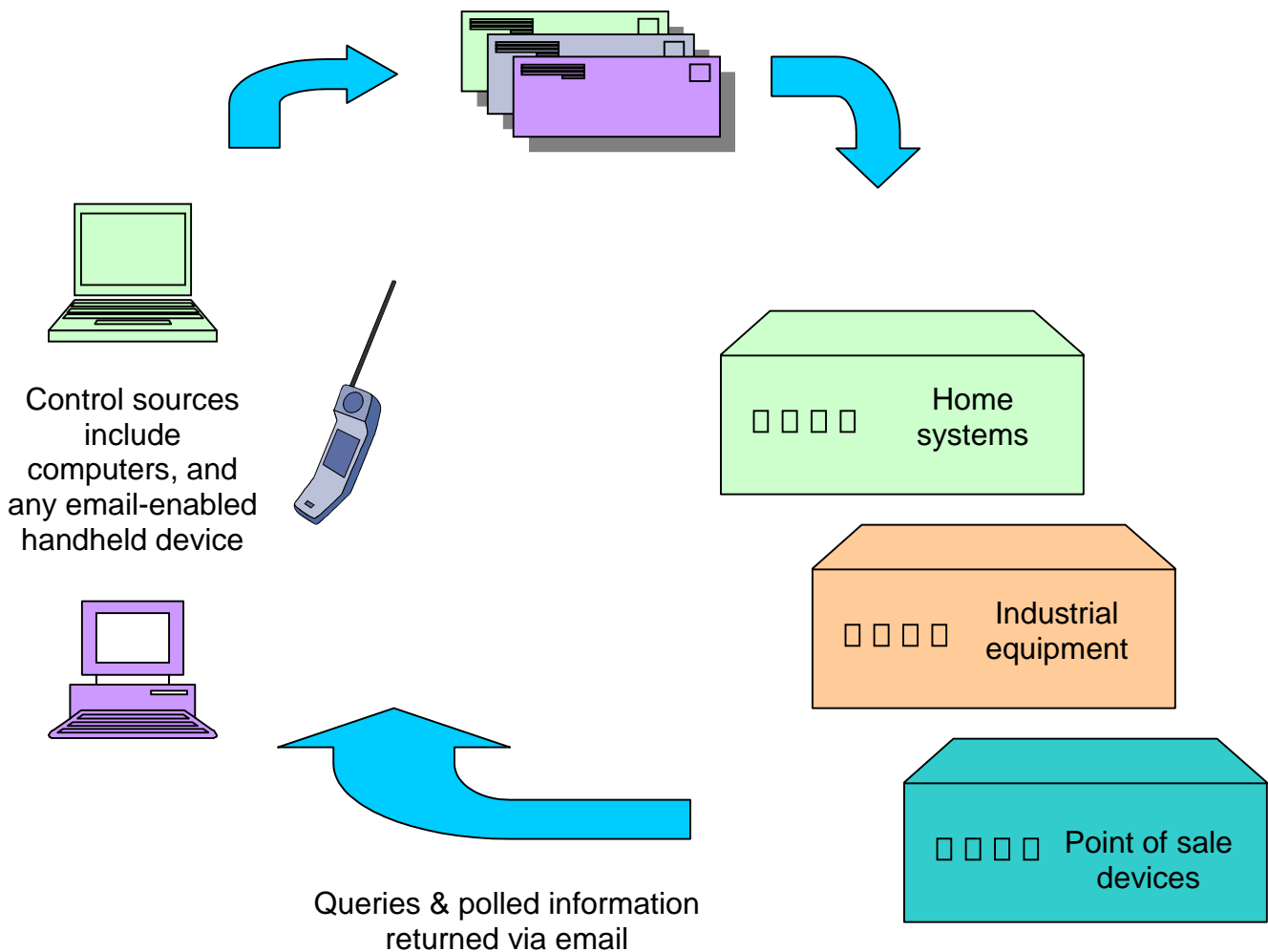
Sending Information and Commands to Remote Devices

With its "open architecture", CCIT technology can be incorporated into a wide variety of future applications spanning many categories. For example, a hand held device (such as an email-enabled cell phone) could send a command to activate the user's home security system and report back with confirmation that the system has been activated.

Or, a supplier could send a query to an Internet-enabled vending machine and check its inventory.

Or, an Internet-enabled gasoline dispenser could be instructed to run a self-diagnostics program and report any irregularities. Future Internet-enabled gasoline dispensers will also include large displays that can contain weather and traffic advisories as well as in-store product promotions. Multi-level management of this information can also be accomplished through the use of CCIT technology.

Encrypted RPM email documents include instructions and triggers used to control remote devices



Reedy Creek Technologies, Inc.

Reedy Creek Technologies provides Internet-based software solutions and technology to help businesses manage and distribute information, including the automation of distributed command and control networks. These software solutions utilize Reedy Creek's patented Command and Control Internet Transport ("CCIT") technology. The company is building upon its initial CCIT application called Real-time Page Management ("RPM")[®], as well as expanding its growing relationships with OEM's who wish to leverage CCIT technology.

CCIT's open architecture technology is ideal for enabling cost-effective command and control solutions that are limited only by one's imagination. To learn more, visit our web site at www.reedycreek.com, or call (919) 934-6869 to speak to one of our CCIT experts.

Connecting people and things!