The International Presence Group

"Integrating FAX With Your Document Workflows"

Faxes received to a network fax server provide a number of opportunities to initiate document workflows, and although there are challenges with working with received faxes, the benefits can be substantial. As faxes arrive in the TIFF image file format, and are not searchable content, one challenge is to convert the content so that it can be brought into applications and business processes. The simpler and more automated this conversion is, the more efficient the workflow can be.

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1. Executive Summary

Document workflows are central to critical business processes in all industries. In mortgage banking, there are workflows for receiving mortgage applications, initiating the loan approval process, requesting/obtaining additional documentation, and completing the loan transaction. In healthcare, there are workflows for initiating a prescription, recording the order to the patient's electronic medical record, sending the prescription request to a pharmacy, and then confirming the pharmacy has received the request.

These are just two examples of critical document workflows. Across many industries, there is a need to process content from documents into applications and processes, so that: the information can be acted on quickly; the information and information access is recorded and retrievable; the transactions, whether loans, prescriptions, or product orders, can be completed efficiently.

Document workflows are a component of content management, a market space that takes content from a variety of sources, paper and electronic, and makes it usable to business processes. There are many aspects to content management, including content input/output, content storage/retrieval, and integrating content with existing applications/processes.

Many organizations have implemented content management and document workflow solutions for content communicated via email and the Web. Since fax images are simply another form of content, these same workflows can be made more efficient by incorporating sent and received faxes.

Today, network fax servers are standard equipment for organizations with even moderate fax volumes. Where traditional fax machines connect to a phone line via a modem, and require maintenance, paper, and toner, a fax server is a more cost effective and more efficient network solution for paperless faxing, with users and applications sending, receiving, and tracking faxes electronically. Fax servers also integrate with electronic files and scanned documents.

It might surprise some to learn that fax remains a critical communications medium that continues to grow in volume each year. While email, IM, EDI, FTP and other means are widely used, fax remains the preferred medium for many business applications. Fax transmissions are more efficient and point-to-point.

An email message, on the other hand, goes through many servers as it leaves one organization and travels to a recipient in another. An email may arrive quickly, or instead hours later; it may be trapped in a spam filter; or it may just plain disappear!

Because the fax protocol transmits Tagged Image File Format (TIFF) images, a file format that cannot contain viruses, it does not present a threat to network security and is therefore recognized as being safe and unencumbered. Email, however, is susceptible to viruses, spam, spoofing, among other threats.

Not only is fax a highly reliable means of document delivery, it is a widely practiced one. With volumes of fax traffic coming into and leaving organizations every day, it is a huge advantage to understand the content of these communications, and to incorporate this content into business applications whenever possible.

2. Integrating Received Faxes with Document Workflows

Faxes received to a network fax server provide a number of opportunities to initiate document workflows, and the challenges of working with received faxes, and likewise the benefits, are substantial. As faxes arrive in the TIFF image file format, and are not searchable content, one challenge is to convert the content so that it can be brought into applications and business processes. The simpler and more automated this conversion is, the more efficient the workflow can be.

>> The Basics of Receiving Faxes to a Fax Server

Fax devices of all kinds – conventional paper fax machines, single- user PC solutions, modem-based multi-function printers, enterprise fax server solutions – all talk with one another via the same communications protocol and with the same file structures. Fax devices communicate using the T.30 fax transmission protocol, which defines the procedures, such as call establishment, message transmission, and call termination, necessary to transmit a document over the Public Switched Telephone Network (PSTN) from one fax device to another.

A TIFF file is an image (as is a bitmap), and cannot be searched for content, (as can a text file). A fax server application, for example, typically provides a TIFF Group 3 file to a Brooktrout fax board (or similar fax board or modem). The Brooktrout fax board establishes connection with the remote fax device and transmits the data contained in the TIFF file. The remote fax device receives the data and reassembles it as a TIFF image, either for retrieval by a fax software application, or spooled directly to a printer.

As explained by this simple fax transmission overview, faxes received by a fax board within a fax server solution are delivered to the fax software application as TIFF files, which, while secure, are not searchable. The solution is to integrate a workflow with the fax server that uses Optical Character Recognition (OCR), barcode recognition, or automatic delivery to a manual data process to read the content.

When a fax is received to a network fax server, there are a number of data points (or properties) immediately available for working with the fax. These properties include such information as the date and time received, the number of pages, the Caller ID, and the Transmitting Subscriber Identification (TSID), where the Caller ID is the phone number of the sending fax device, and the TSID is an identifying string that is optionally programmed into the sending device. (On most faxes, the TSID, if any, is displayed at the top center of the page, and is typically the sending company name or fax number.).

Another important piece of data known as soon as the fax is received by the fax server is the fax phone number to which it was sent. Many organizations assign fax numbers to individual users, groups of users, or network locations. Accordingly, when a fax is received by the fax server, it can be automatically routed to the specific destination associated with that fax number. This routing mechanism relies on the availability of a range of Direct Inward Dial (DID) fax numbers, much the same way an organization has many direct dial phone extensions on a limited number of physical phone lines.

Faxes received to a fax server can be routed to any number of different destinations, such as individual email addresses, a desktop or browser-based fax application, groups of users, or shared mailboxes. Other destinations for received faxes include such network locations as UNC, FTP, and Secure FTP (SFTP), third party applications, and printers.

For each received fax, the fax board within the receiving fax server provides a TIFF file to the fax server software application, which may be configured to convert the TIFF to a Searchable PDF file. Automatic conversion to PDF has the double benefit of making the received fax easily viewable with common PDF viewers, while also making its content searchable and actionable.

>> Advanced Fax Routing Options

In addition to such basic received fax routing options that generally rely on a single known data point, fax routing workflows can be multi-step processes that utilize multiple data points – including properties known immediately, data extracted with OCR/barcode recognition, and data obtained from external network databases and applications.

OCR can be very useful in implementing advanced fax routing workflows: converting the TIFF image to a searchable PDF; routing according to the OCR results; initiating a more complete data capture process based on the OCR results. OCR is most useful for fax workflows when the received fax contains structured data, such as that of a form. In a mortgage processing workflow, for example, the initial mortgage application may include the title "New Loan Application" at the top, which can be reliably retrieved as a string to route the workflow into the mortgage process. Subsequent documents sent out requesting additional documentation might include the phrase "Loan Number" followed by a typed loan number, also pieces of data reliably retrieved by OCR and used to deliver the fax to a second workflow for loans already in process.
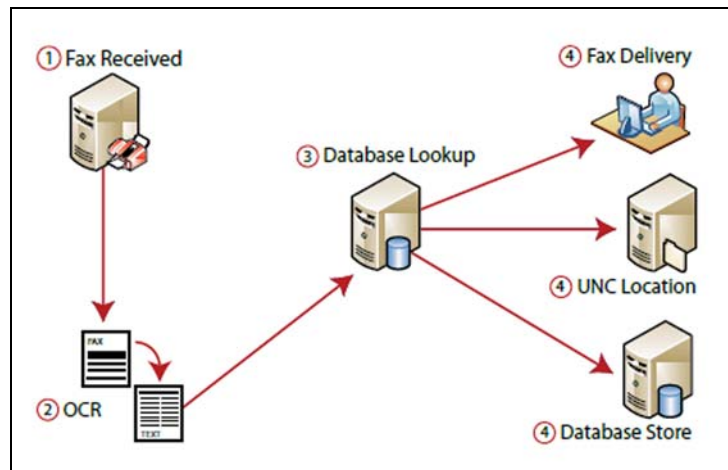

Fig. 1 Advanced FAX Routing

Reading barcodes from received fax images provides similar fax routing benefits to those with OCR. Barcodes are used in fax workflows where the fax receiver has created forms with barcodes that identify the fax sender, or identify the type of document. For example, there are many forms for many different services provided by each state's Registry of Motor Vehicles (RMV). These forms are typically available in RMV offices and on RMV Websites, and each form typically includes a barcode. When these forms are completed and faxed in to the RMV, the fax server solution can read the barcode, identify whether the form is a registration renewal, a change of address, or another request, and deliver the fax to the correct workflow.

Barcodes can also be used to identify the fax sender, and possibly the contents of the fax. One example is a pharmaceutical company that provides a secure Website on which doctors can request samples of new prescription drugs. In that implementation, a doctor visits the site, requests particular drugs in particular quantities, and prints a form that includes the physicians' name, certain other details, the drugs ordered, and a unique barcode. The doctor signs the fax – a step required by law – and faxes the document to the

pharmaceutical company. The fax server at the pharmaceutical company reads the barcode, and retrieves stored data for the physician and the order contents based on the extracted data.

While OCR and barcodes are frequently used in advanced fax routing workflows, they are not required. Some workflows benefit from the fax software's ability to make multi-step fax routing decisions, and to query network resources. A simple example is an advanced fax delivery route based on the date and time the fax is received. Faxes received Monday through Friday between 9:00am and 5:00pm could be delivered to a shared mailbox. Faxes received after hours or on weekends could be delivered to an FTP location.

To route faxes based on the received fax number (DID routing), a query is made to either a fax user list or more commonly an LDAP Directory Service such as Microsoft's Active Directory (AD). It is also possible to query other network resources, as, for example, when, routing is done by capturing the Caller ID and querying a network database to identify the company name of the sender. A second query to another database might return the email address of an account manager assigned to this company to whom to deliver the fax.

>> Image Indexing & Data Capture Options

The first benefit of advanced fax routing is delivering received faxes to the correct destinations without any manual decision making. The second benefit is the result of then extracting the fax content so that it can be automatically acted upon by the right individual. Depending on content, loan applications can go directly to the application evaluation department; purchase orders can go automatically to Accounting and/or Manufacturing for fulfilment.

This data capture ensures faxes are delivered to the specific individual assigned to act on the fax content. Ideally, to make workflows more efficient, that individual should have full screen view of the image as well as a pre-determined data entry form in which to enter data retrieved from the image. That data is then stored in a relational database, and is associated with the fax image.

An example of how capturing data improves document processing is the workflow of the Central Scheduling Office of a hospital. This office receives faxes electronically (i.e., not as paper) from physicians who need to book appointments for MRIs, CT Scans, surgeries, and other services. The received fax is delivered to the data capture/image indexing application, where the first user in the workflow views the fax and enters into the data fields the physician/patient names and the appointment requested. Once processing is completed by the first user, the fax moves to the next user ("role") in the workflow, who begins the appointment scheduling process, and the first user works on the next unprocessed fax.
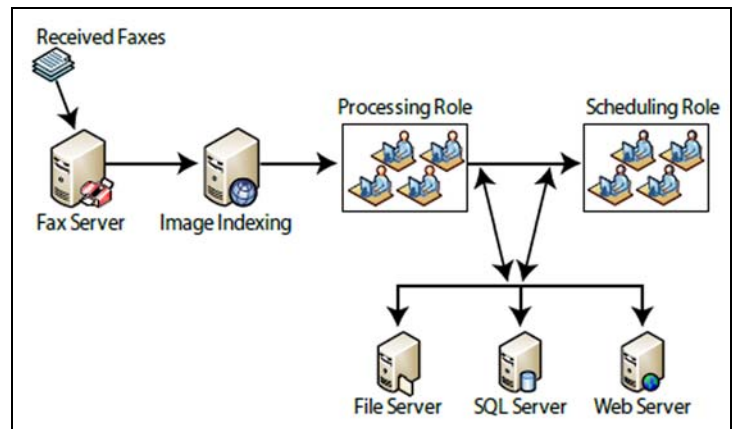

Fig. 2 Image Indexing

Another example of a data capture workflow is a global shipping company that receives faxed customs forms requesting approvals required for the release of international shipments. The first workflow participant

views the image, retrieves and enters various pieces of data, including the form number; the fax is then automatically routed according to the form number and the processing status to an individual whose role it is to determine whether customer contact is required.

Received fax data capture and image indexing applications often provide such advanced features as stapling, where related documents are correlated with one another in the document database; monitoring and alarming, where alarms can be generated for documents that have not been processed within the expected time frame; and double-blind data confirmation, where multiple users capture the same data field, with the results matched to confirm accuracy.

>> Enterprise Content Management (ECM) Integration

Many organizations have implemented ECM solutions that store and manage documents from multiple sources. These solutions generally provide a document repository where documents are stored and indexed for easy search and retrieval. These solutions often have various interfaces for receiving and processing documents, and for retrieving and sending documents. A critical aspect of ECM is that all such tasks are typically recorded to provide an audit trail of information access.

Many ECM solutions offer data capture and indexing features for workflow processing of documents sent/received through email and Web Interfaces, and it is clearly beneficial to also include fax. By using such basic fax delivery means as DID routing, or such advanced routing features as OCR and barcode recognition, faxes can easily be delivered to ECM solutions for further processing.

An example of this integration is the accounting department of a manufacturing company that receives all of their faxes on a single fax number. Since most of these faxes are forms, such as purchase orders, invoices, and statements, which can be identified by OCR/barcodes, the advanced fax routing component of the fax server can identify the document type and deliver it directly to the associated repository within the ECM solution. The ECM solution then has mechanisms to notify the user responsible for processing that document type.

3. Integrating Sent Faxes with Document Workflows

While many document workflows process content coming into an organization, many other workflows process content emailed and faxed out of the organization. In a mortgage processing workflow, for example, where supporting documents in need of signatures are faxed out, the outbound fax, and the need for a return fax with a signature, is recorded to the mortgage workflow. When the return fax arrives, the workflow can proceed to the next step.

>> The Basics of Sending Faxes through a Fax Server

The basic elements of outbound faxing through a fax server that pertain to document workflows are the capability to send a fax from an application, the capability to track the status of the fax to determine whether the fax delivery is successful or not, and the capability to record these details to another application or process. Some applications may also require a copy of the fax image for reference and/or compliance purposes.

>> User Interfaces for Outbound Fax Workflows

An enterprise fax server offers multiple interfaces for users to submit faxes, with the most common user interface being email. A user attaches such native files as PDF or Word to an email message, and addresses the email message to a fax number. The user may have to remember the correct syntax for email to fax, such as name.fax#@faxdomain.com, or the fax server may provide a client dialogue within the email client that enables simple fax addressing. The email message is then sent to the fax server, which attempts to transmit the fax to the destination fax device. Once completed, an email specifying whether the fax delivery succeeded or failed is returned to the sender.

Beyond email integration, an enterprise fax server also offers Web and desktop fax client support. These dedicated fax applications can take the burden off email and also offer such workflow features as shared mailboxes accessible to multiple users. A Web client is especially useful for remote users who need nothing more than a Web browser to send/receive faxes.

>> Application Interfaces for Outbound Fax Workflows

Applications are often fax-enabled as part of an outbound document workflow, as, for example with electronic delivery of prescription requests from physicians to pharmacies. The physician works from a handheld device running an Electronic Medical Record (EMR) application, and, within the EMR application, selects a drug to prescribe, enters any additional notes, and chooses a pharmacy to which to send. The EMR application uses an Application Programming interface (API) to submit the prescription request and doctor's notes, along with the pharmacy name and fax number, to the enterprise fax server for delivery. When the delivery is complete, a record of the fax delivery is added to the patient's electronic record in the EMR application.

The interface between the business process, in this case an EMR application, and the fax server, is an API, which enables the application to send faxes, query for status of fax jobs, and retrieve received faxes. Some APIs are simple file drops, with the document to be faxed dropped in a network location along with a header file containing the fax recipient details. (A variation on this API parses the document to be faxed for the fax recipient details.) Since applications are easily email-enabled, SMTP is often employed as an API, and other API options include .NET, Web Services, Java, and COM.

4. Fax Server Basics

The unique advantages of fax make it an absolute necessity for most organizations. It is point-to-point, real-time communication; with the capability to verify receipt and give you the confidence your communication is secure. Fax is a also a virus-free communication, a fact that has permanently secured its importance as a means of information delivery. Globally, fax is the most ubiquitous and most reliable way to send information from one point to another.

Fax server solutions are used for a wide variety of applications, including:

- Users sending/receiving faxes from their desktops via such email applications as Outlook, and via desktop/browser based fax clients.

- Applications sending/receiving faxes through automated processes, as for example, when purchase orders or invoices prepared by an accounting application are automatically submitted for fax delivery.

- Users in customer service and order processing workgroups accessing a shared mailbox to process received faxes as they arrive.

Fax server solutions provide a number of tangible benefits, including:

- Automating every day business processes that otherwise must print documents and manually send them through fax machines.

- Reducing the hard costs of fax machines, including leasing, maintenance, paper and toner.

- Providing a secure, reliable, and proven way to communicate information from your enterprise to any other worldwide.

- Reducing spam fax traffic by monitoring and quarantining received faxes.

>> Fax Server Solution Architecture

An enterprise fax server solution consists of three components: the fax server, the fax queues, and the users and applications sending/receiving faxes. There are variations in each of these components with regard to operating system, phone, and network operability support. Functionally, however, these three components combine to enable faxes to be sent and received electronically.

The first component is comprised of the users and applications that send/receive faxes, whether email/Web/desktop client users, or such applications as EMR working with an API. These users and applications submit faxes – along with fax recipient information and fax job details – to a fax queue, and a single fax server solution may utilize many fax queues as a means of organizing fax users and applications.

As the name implies, the fax queues are tasked with queuing outbound fax jobs in the order in which they were received from users and applications, while also accommodating any assigned priorities. The fax queue may also have other functions, such as confirming whether the sender has "send fax" permissions,

determining whether any specific cover pages are assigned to the sender, and evaluating the priority levels allotted to the sender. These attributes may be broad queue properties, or may be assigned to individual users by a policy.

The fax queue downloads fax jobs to the fax server for translation and transmission. The fax server translation process converts the native file formats to TIFF before initiating the fax transmission. The fax server then contacts the remote fax destination, typically either another fax server or a traditional paper fax machine, and begins the fax transmission. Once the transmission is complete (i.e., all specified retries have been completed), a completion status is returned to the queue, and the queue then returns that final status to the originating user or application. Received faxes follow this same path, beginning with receipt at the fax server and delivery to a fax queue. The fax queue then identifies the final destination; possibly by querying a directory service such as Microsoft's Active Directory for a match on the received fax number. Advance routing to email, printers, applications, UNC, FTP, and SFTP locations can then take place according to OCR/barcode extraction and Caller-ID/TSID information.
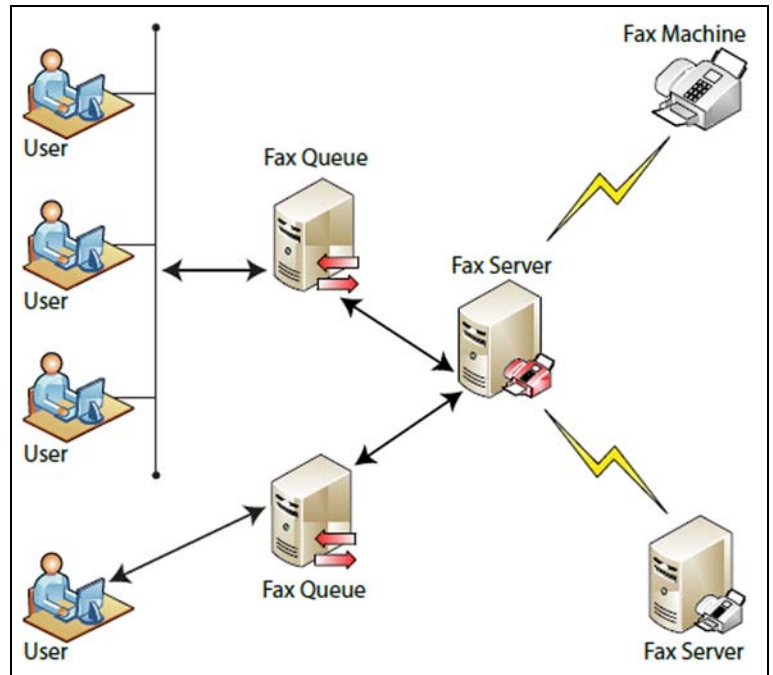
Fig.3 iMPS Queues

>> Telephone and Network Connectivity

Fax servers traditionally connect to the PSTN (Public Switched Telephone Network) via analog or digital phone lines. With this model, fax servers include an analog or digital fax board that connects to local (via PBX) or central office (direct to the phone company) phone lines. There are many variations on PSTN connectivity, including analog, DID, T1, Primary Rate ISDN (PRI), Basic Rate ISDN (BRI), and E1.

Fax servers are now being integrated with Voice over IP (VoIP) networks, in order to implement Fax over IP (FoIP). Understanding how faxes are sent over an IP network requires a basic understanding of the T.30 and T.38 communications protocols. T.30 is the protocol that describes the communication process between two fax devices on the PSTN, while T.38 is the protocol that describes the process for sending/receiving faxes in real-time over a packet network – i.e., a VoIP network. T.38 is designed to preserve the traditional fax experience and ensure that faxes are successfully sent/received in real-time as a point-to point communication.
Faxing over an IP network requires a fax board or fax software that supports FoIP, and a VoIP network with a T.38 gateway that supports Session Initiation Protocol (SIP) or H.323 call control. The T.38 gateway acts as a bidirectional bridge between the telephone and IP networks, and sits between the fax server solution and the destination fax device. On the internal VoIP network, the T.38 gateway sends/receives T.30 data wrapped in T.38 packets, while externally it sends and receives T.30 fax signalling over the PSTN. Note that

T.30, the same protocol used for faxing over the telephone network, remains at the heart of every IP fax connection. The fax board or fax software within the fax server is responsible for negotiating, synchronizing, and communicating with the destination fax device.

>> User Administration – Directory Services and Policies

The fax queue is the part of the fax server solution that contains most of the business logic. It accepts jobs from users and applications, queues them for download to the fax server in order of arrival and priority, manages retries, and collects completion statuses and received faxes from the fax server for delivery to users and applications.

A true enterprise fax server integrates with an LDAP-compliant directory service such as Microsoft's Active Directory (AD). Since such a directory service already organizes your user community, it is ideal for the fax queue to reference it as the fax user list, rather than your having to maintain a second duplicate list. (Note that not all users are necessarily given fax permissions.)

In fact, given the many features offered by an enterprise fax server solution, it's likely that an administrator will want to control just which features are available to specific user groups, and also define the particular attributes of these features. This control is accomplished by applying policies created in Microsoft's AD Group Policy or as general LDAP policies. Policies can be used to apply rules or define attributes for groups of users already organized in the directory service.

An example of how directory service policies can be applied to a received fax is as follows. A fax is received to the fax server, which checks the received fax number to determine the fax queue to which to route the fax. The fax queue receives the fax and all of its metadata, including such details as the dialled phone number, Caller-ID/TSID of the sender, the date & time, and the number of pages. The fax queue queries the directory service for a match on the dialled fax number, returns the user name to whom the fax is to be delivered, as well as any polices that apply, such as the stipulation that the user receive the fax not as an email attachment, but rather as an email notification containing a link to the network location where the fax is stored.
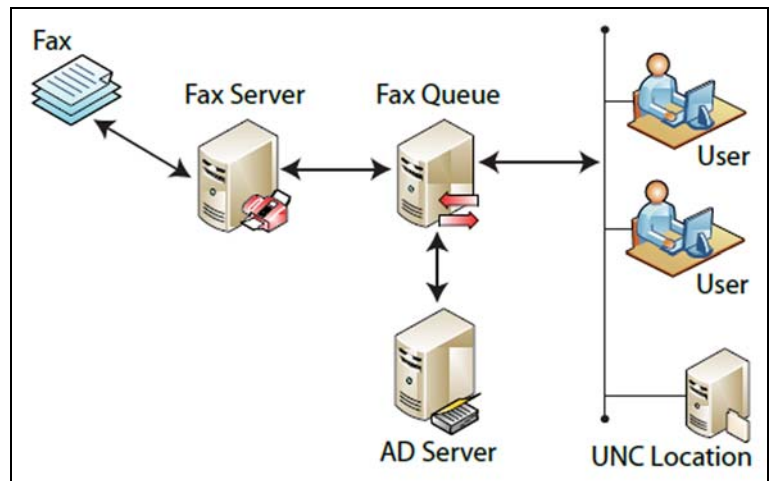
Fig.4 Directory Services and Policies

An example of how directory service policies can be applied to a transmitted fax is as follows. The fax queue queries the directory service for any fax policies that apply to the fax sender, such as one that restricts the sender to a specific cover page and priority. These attributes are then applied by the fax queue, and the job is queued accordingly. There may also be a policy that requires this user's faxes to be approved by a supervisor. In that case, the fax is delivered to the supervisor, who must either approve or reject it. The fax queue then queues the fax for download to the fax server (if it is approved by the supervisor) or returns the fax to the sender (if it is rejected by the supervisor).

>> Application Administration

A Windows-based fax queue is administered via a Microsoft Management Console (MMC). The fax service administrator runs the MMC to create, deploy, move, and delete queues on servers throughout the organization, assigning users to queues through directory services, and specifying permissions and attributes through Policies.

>> Fax Activity Tracking & Reporting

A critical feature of an enterprise fax server solution is the capability to track and record all fax activity to a searchable relational database such as SQL. For an outbound fax, this tracking/recording includes when the fax was created and submitted to a queue, fax job download to the fax server, and completion status returned to the fax queue from the fax server. For a received fax, this tracking/recording includes when the fax was received to the fax server, routed to the fax queue, and delivered to the intended recipient.

5. About the Author – International Presence Group

The International Presence Group was founded in 1986 and pioneered the fax server marketplace, providing many of the world's largest organizations with its popular iMPS Servers. In addition to enterprise fax server products, International Presence also offers other related document workflow, codeless development and automation tools.

International Presence's FAX server solutions include the IMPS2 Lite and iMPS2 Enterprise Servers and advanced FAX routing, job tracking, reporting and image indexing software with iMPS DMS.

If you would like to know more about improving your FAX processes or integrating FAX with your Document Workflows then contact you nearest office today or visit our product website at
www.FaxAndEmailSoftware.com

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