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Implementing Fax over IP in your Organization

OpenText Information Exchange

Once voice systems have migrated to Voice over IP (VoIP), fax communications are the next logical addition to an IP-based environment. This white paper discusses how fax servers and new Fax over IP (FoIP) investments fit into an organization's overall unified communications and document delivery strategy. It also calls attention to issues and challenges organizations should consider when determining how best to take advantage of traditional telephone-based systems, FoIP, or a mix of both.

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Executive Summary

The convergence of data and communications networks via the Internet Protocol (IP) is occurring at an ever-increasing pace as organizations look to consolidate equipment and streamline management and administration overhead. The objectives behind this consolidation are simple: reduce IT infrastructure costs and manage all data and communication applications more efficiently. Because communication technology is quickly standardizing on IP, there is a natural overlap between those applications that already rely on a traditional circuit-switched communications backbone, and the evolving IP-based environments. The challenge for organizations today is to fully understand how existing network applications, including those that are distributed over an enterprise, can take advantage of newer IP-based approaches to data communications.

Many companies which have embarked on the IP path have begun with voice communications. This is a logical starting point, since Voice over IP (VoIP) standards have been in place for many years, and many telephony systems now support VoIP. Now, as Fax over IP (FoIP) technology has matured, organizations can gain additional benefits from their network investments by consolidating their fax server system to utilize the Internet for end-to-end communications.

When it comes to sending and receiving faxes on a network, the data communication from endpoint to endpoint is only part of the story. The network-based fax server application is the true engine behind electronic document delivery because it has the intrinsic ability to act as a centralized hub for securely and cost-effectively exchanging all types of documents. It captures business documents from a variety of desktop or back office applications and then applies rules for processing, formatting, tracking and delivering outbound fax documents over a telephone system or the Internet. A fax server is also often deployed in a distributed environment to provide efficient and reliable faxing services to remote locations such as branch offices and backup sites.

This white paper discusses how fax servers and new FoIP investments fit into an organization's overall document delivery strategy. It also calls attention to issues and challenges organizations should consider when determining how best to take advantage of traditional telephone-based systems, FoIP, or a mix of both.

IP Communications Overview

As organizations continue to build out and expand their IP infrastructure, VoIP has moved into wider adoption with FoIP following close behind. Both technologies bring traditional telephony applications (voice and fax) into data network environments, allowing organizations to transport phone or fax calls over an IP data network (either a public Internet or an internal network).

Many organizations view this consolidation of data and communications resources as an opportunity for considerable savings and efficiencies because it leverages a single, common resource and employs the Internet and company intranets for cost-effective voice, fax and data services.

IP and voice

VoIP adoption has grown rapidly as technology and interoperability issues are being resolved and broadband connectivity has expanded. Now as never before, organizations of all sizes are turning to VoIP to consolidate their communications infrastructure. As a result, many organizations have begun to recognize the immediate benefits of using the Internet for all or part of their voice communications, replacing or complementing traditional PSTN-based deployments.

Growth of VoIP is driven by several factors such as:

- Having an integrated phone system across multiple locations
- Removing the burden of hosting on-site telephony infrastructure
- Ensuring scalability
- Reducing operational costs
- Converging voice and data networks

IP and fax

Converging voice with fax is not new. Organizations have benefited from the consolidation of fax with voice systems in various circuit-switched, messaging applications for many years. Traditionally, these systems have been based on the time-tested and reliable phone system and backed up by the T.30 fax protocol, which is used to establish and maintain communication between two fax devices. Furthermore, the modern day network fax server is no stranger to company LAN/WANs, using IP protocols for networking, access, and integration purposes. Remote client access, web tools, and email integration are all examples of how fax servers have leveraged the Internet for many years.

Organizations that use fax servers for web access, email integration, desktop messaging, automated faxing, or MFP faxing have new opportunities to migrate all or part of that environment to take advantage of FoIP. Organizations most likely to adopt FoIP include those that are:

- Adopting a strategy to consolidate voice/fax and data
- Looking for ways to reduce IT/telephony support and maintenance costs
- Planning to transition from analog to an all IP environment (no copper)
- Migrating towards virtualized environments for mission-critical applications
- Investing in a new "Greenfield" facility based on all IP
- Using a legacy circuit-switched messaging system that will migrate to IP
- Planning to reduce the total cost of ownership for their fax server

FoIP Technology Overview

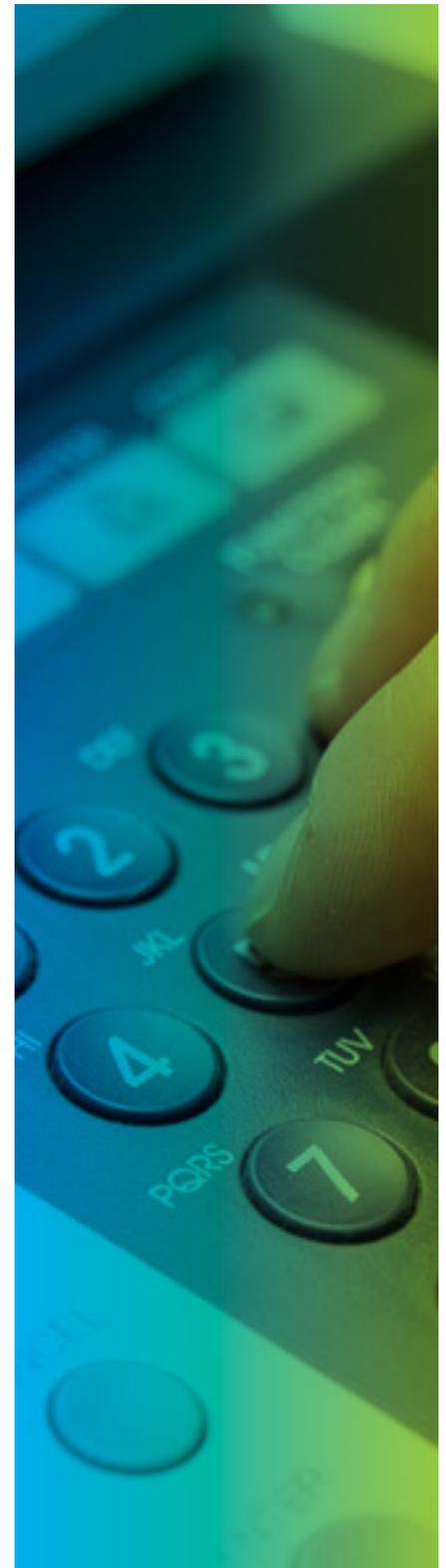
At the core, there are four main types of telephony technologies involved with FoIP:

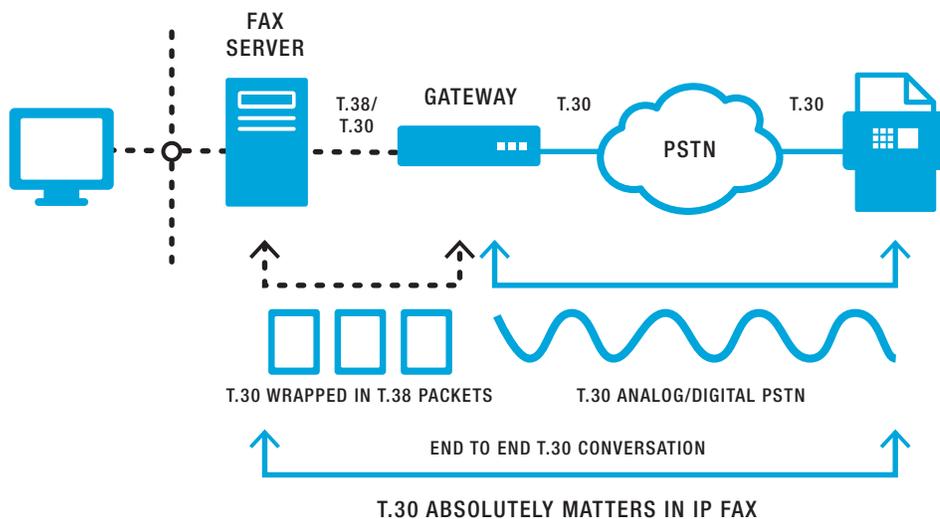
- G.711 - this pass-through works just like a voice over IP (VoIP) call where every component of the fax communication is sent in the form of voice packets. Fax is very sensitive to packet loss, and if you lose some of those voice packets, the fax can easily be corrupted and fail. Also, because the traffic is all voice packets, bandwidth demands can be pretty high.
- T.30 – faxing over the publicly switched telephone network (PSTN). Used to establish and maintain communication between two fax devices.
- T.38 – Real-time faxing over the Internet, delivered like a fax call. Encapsulates the T.30 protocol into T.38 data stream.
- T.37 – Store and forward faxing using the Internet. Uses email protocols like MIME or SMTP to translate faxes into emails.

Both the store-and-forward (T.37) and real-time (T.38) methods use the standard T.30 fax definition to recognize transferred data and to maintain compatibility with existing fax devices. The primary difference between these two approaches is in the method of delivery and confirmation receipts.

Real-time FoIP is based on the International Telecommunications Union (ITU) standard T.38, which describes the technical features necessary to transfer facsimile documents in real-time between two standard Group 3 facsimile terminals over the Internet or other networks using IP protocols. T.38 is the preferred FoIP protocol as it aligns with the behavior of faxes over the PSTN. As with T.30, the IP fax transmission is handled like a standard fax call and an end-to-end communication is established.

A fax server that sends or receives faxes using T.38 looks just like any other non-FoIP fax device to its partner. The two end points establish a session, send and verify the transmission of one or more pages and then complete the session with active confirmations from both sides. The difference with a FoIP-enabled server is that the first part of the communication session from the server to the network traverses an IP network rather than traveling directly over the PSTN. If the partner device is directly addressable on the same network, the session can use T.38 for the entire transmission. But if the devices are separated by the telephone line, the IP switch manages the “unwrapping” of T.38 packets into standard T.30 fax transmissions over the PSTN.





T.38 is the main driver of today’s advancements in IP faxing and is the protocol of choice for organizations seeking to use their IP infrastructure to reap the benefits of real-time fax communications. T.38 protocol support is built into almost every leading manufacturer of IP routers, IP-PBXs or media gateways. It can be supported via a class of intelligent fax boards that can provide either T.30 PSTN or T.38 FoIP output or via the fax server software directly without using intelligent fax boards.

T.37 is the other FoIP protocol. T.37 is an ITU standard for sending fax across IP networks in a store and forward mode. Fax messages are sent as MIME-encoded email attachments using SMTP. A T.37 implementation used with a gateway allows an organization to receive faxes—sent from regular fax machines on the PSTN—as email messages. Conversely, organizations can send email messages out over the PSTN as faxes.

Overview of Fax Server Usage within an Organization

Faxes represent unalterable, legally binding documents that are essential for business processes such as invoicing, purchasing, finance, legal, and supply chain management. Compared to email, fax communications are more tamper-resistant, more secure, and provide more reliable delivery and notification options. To manage the high volume of inbound and outbound faxes that are part of normal business activities, for years organizations have relied on the horsepower of a client-server based network or enterprise fax server. Users anywhere on the network, whether local or remote, can access the fax server through a variety of thick or thin clients or via email and messaging applications such as Microsoft Outlook or Lotus Notes. In addition, some fax servers are capable of extracting data from host or mainframe applications and automatically delivering thousands of invoices or purchase orders to individual recipients.

As a result, the network-based fax server is the hub of many document-centric business applications and is considered a mission-critical application for a variety of reasons including the ability to:

- Provide proven, reliable, and secure electronic document delivery, receipt, tracking, and management
- Reduce costs
- Increase efficiency with smart process flows for creating, receiving, routing, reviewing, and approving documents
- Integrate with essential business applications such as CRM, document management, email, ERP, workflow, and host systems, as well as multifunction products (MFP)
- Distribute fax services across the enterprise, including remote locations
- Support compliance and regulatory requirements by offering tamper-resistant document delivery and audit trail
- Offer high-availability fax services, complete with redundancy and failover capabilities

Benefits of fax servers using FoIP

Organizations that are adopting an IP telephony environment may further streamline their messaging infrastructure and enhance the benefits of their existing fax server by enabling it to support FoIP. Some of the benefits include:

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- COST SAVINGS**
- Eliminate fax machines and associate expenses (phone lines, paper, long distance charges, etc.)
 - Reduce maintenance costs by consolidating voice, fax, and data on a single network
 - Reduce Total Cost of Ownership (TCO) savings due to network consolidation
 - Lower labor costs by automating labor intensive business processes that involve generating, sending and receiving invoices, purchase orders, loan applications, order confirmations, and other transactional documents
 - Lower energy costs using software-enabled FoIP in virtual environments
 - Support enterprise server virtualization initiatives with 100% software solutions enabled by appliance gateways

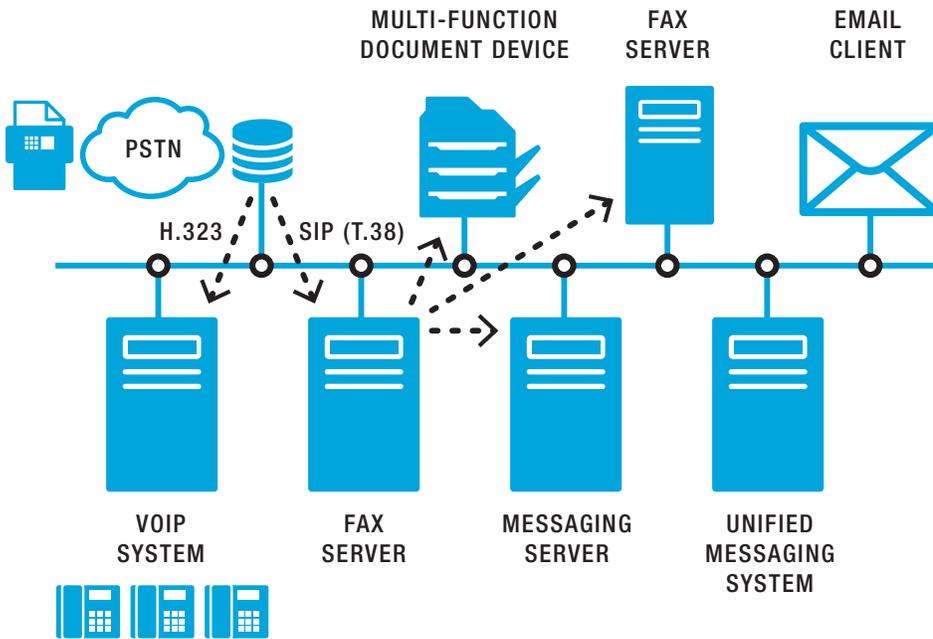
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- EFFICIENCY**
- Increase efficiency with smart process flows for creating, receiving, routing, reviewing, and approving documents
 - Bolster efficiencies associated with managing consolidated network equipment that supports VoIP and FoIP

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- FLEXIBILITY**
- Use software-only solutions, boarded, or combination FoIP solutions depending on an organization's needs
 - Scale fax server with additional channels, capacity, and integrations to meet evolving document delivery needs

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- INTEROPERABILITY & COMPATIBILITY**
- Push consistent fax solution throughout the entire network including remote locations
 - Strengthen investments made on IP equipment that interoperate with the fax server
 - Minimize downtimes
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OpenText RightFax and FoIP

OpenText RightFax is the proven market leader in fax server and document delivery software. It delivers the most reliable and robust fax software solutions to integrate and automate the flow of a full range of fax, paper, and electronic documents and data, enabling enterprises to achieve significant cost reductions. By using RightFax, companies can securely and efficiently deliver business information from virtually any application via fax, email, print devices, or over the Internet.



IP faxing methods supported by RightFax

RightFax offers flexibility when it comes to deploying FoIP. Organizations can choose software, hardware, or a combination of hardware and software solutions depending on individual requirements, making it easy for companies to leverage their IP infrastructure.

Options include:

SOFTWARE-ONLY SOLUTION

T.38 - Real-time faxing over the Internet

- Uses Dialogic® Brooktrout® SR 140 software
- For organizations requiring a software-only solution
- Less time and money on hardware and related maintenance

FAX BOARD SOLUTION

T.38 - Real-time faxing over the Internet

- Uses a Dialogic® Brooktrout® TR1034 T.38 hybrid board
- Can be used for either traditional PSTN faxing or FoIP Faxing

COMBINED SOFTWARE AND HARDWARE SOLUTION

- Combines hardware and software
- Can be used when transitioning to IP environment or supporting legacy networks



Considerations of software and hardware FoIP solutions

When considering FoIP communications as part of an organization's RightFax strategy, there are some important factors to be taken into account when weighing the tradeoffs between traditional deployments using PSTN or those using an IP solution. One of the challenges is navigating the variety of possible configurations and topologies that might exist to support a wide range of individual environments. Another challenge is to understand the amount of extra equipment that may be required. FoIP-enabled routers, media gateways, and switches need to be considered right alongside fax servers and intelligent fax boards. Regardless of the challenge, each FoIP option comes with distinct advantages and benefits, each of which can fit an organization's objectives for a smooth and successful deployment.

Setting up and deploying FoIP

RightFax uses transport service architecture (called DocTransport) to setup and deploy FoIP solutions. This DocTransport service can setup and configure software, hardware, or combination FoIP solutions. The licensing, setup, and configuration tools are built in to the DocTransport service, making FoIP easy to administer. For distributed environments, RightFax uses this transport architecture to setup either the hardware or software method to run remotely, whether a separate machine in the local datacenter or at a remote location. This can help serve redundancy schemes, load balancing, virtualization scenarios, or enable remote offices to send and receive faxes via IP. Scalability is available for both options too, with capacities ranging from 2 to 120 fax channels per server.

Virtualization—implementing a software-only FoIP solution

Software driven FoIP solutions provide many advantages, especially for those companies with virtualization strategies or those that are standardizing on an all IP infrastructure. RightFax uses Dialogic® Brooktrout® SR140 software to translate fax data from the fax server into real-time fax packets. Because it is software-based, companies can take advantage of virtualization for their RightFax fax server, using less server machines and leveraging existing infrastructure. In addition, because there are no fax boards, organizations can better serve "green" strategies for their datacenters, since less physical resources are required.

Implementing a Hardware FoIP Solution

Intelligent fax boards have been deployed with fax server software for many years and are considered time-tested and proven. The boards use on-board Digital Signal Processing (DSP) technology which does not burden the application server's CPU, thus leaving the majority of a server's processing power for the fax server software. RightFax uses Dialogic® Brooktrout® TR1034 intelligent fax boards, capable of supporting the industry's first T.38 V.34 implementation. V.34 can double the speed and cut transmission time in half. The boards support both traditional TDM and IP configurations at a wide range of densities, making them very scalable. Many organizations today have deployed TR1034 boards in circuit-switched TDM configurations. However, because they also support IP, there is a latent opportunity to migrate the boards to IP when the need arises. This protects the investment made, and sets the stage for an IP solution for the future. Although the boards require a form factor inside a server machine, they can be setup in dedicated machines, separate from the fax server itself to offload CPU processing from the fax server.

Features and Benefits of Hardware, Software and Combination FoIP Solutions

HARDWARE RightFax with Dialogic® TR 1034® Intelligent Fax Boards	SOFTWARE RightFax with Dialogic® SR140® FoIP Software	COMBINATION RightFax with Dialogic® SR140® FoIP Software and TR 1034® Intelligent Fax Boards
<ul style="list-style-type: none"> ▪ Supports T.38 real time fax standards ▪ Offers both TDM and IP Faxing capabilities ▪ Enables organizations with existing install base of TR 1034 fax boards to transition to IP without additional significant investments ▪ Encapsulates the reliable T.30 protocol ▪ Uses on-board DSPs to handle the load, lessening use of CPU ▪ Provides built-in tools to license, setup and configure FoIP from within RightFax's DocTransport service. 	<ul style="list-style-type: none"> ▪ Supports T.38 real time fax standards ▪ Suited for companies standardizing on an "all-IP" framework ▪ Suited for virtual environments ▪ Eliminates the need for dedicated fax cards and slots inside of CPU machines ▪ Encapsulates the reliable T.30 protocol ▪ Provides the same features and advantages as fax boards including error correction mode, V.34, support for DTMF, compression, and others ▪ Demands less utilization and energy consumption from datacenter ▪ Provides built-in tools to license, setup, and configure FoIP from within OpenText RightFax's DocTransport service 	<ul style="list-style-type: none"> ▪ Supports T.38 real time fax standards ▪ Suited for organizations with mixed circuit-switched and IP systems today. ▪ Suited for companies with legacy or mixed environments ▪ Provides migration path for companies that need to support mixed TDM/PSTN and IP ▪ Provides migration path for companies transitioning to a virtualized environment over time ▪ Provides built-in tools to license, setup and configure FoIP from within RightFax's DocTransport service

RightFax in an IP Environment

RightFax was designed as a flexible centralized document delivery hub which can support FoIP, traditional PSTN or both. OpenText is committed to ongoing research and development, and has developed longstanding partnerships with leading hardware and software vendors to ensure the application provides the most reliable, robust and adaptable solution for companies transitioning to FoIP. Some of the unique advantages of RightFax fax servers within a FoIP environment include its proven ability to:

INTEGRATE WITH A VARIETY OF MISSION-CRITICAL APPLICATIONS

OpenText provides extensive integration to office programs, document management, email, ERP, workflow, MFPs, and other applications used in ad hoc communications and business operations. It also partners with leading technology vendors including: IBM, Microsoft, Oracle, SAP, HP, Konica Minolta, Xerox, and more.

RightFax can securely send, receive, and manage thousands of faxes a day generated from business applications in a timely, reliable and cost-effective manner.

PROVIDE RELIABLE FAX AVAILABILITY IN A DISTRIBUTED ENVIRONMENT

The capacity of RightFax fax servers can be multiplied by combining two or more servers to share a common RightFax database, no matter the location of the workers or offices.

SUPPORT FOR VIRTUALIZATION

RightFax has an open, multi-layered architecture that deploys into virtualization scenarios in which it can run on virtualized "machines," aiding in cost savings and streamlined management.

With virtualization and RightFax fax servers, organizations can gain numerous benefits and advantages including:

- Enhanced customer satisfaction and levels of service due to higher availability, failover scenarios, backups and security
- Reduced capital expenditures by eliminating the need for dedicated CPU hardware and fax boards
- Lower operating costs as a result of reducing rack space allotments in the datacenter and reduced energy consumption and utilization costs
- Increased IT administration efficiencies by centralizing management of all virtual applications.

PROVEN FAX SERVER LEADER

OpenText is the trusted market leader in fax server software and FoIP with over 100,000 servers deployed worldwide and millions of users.

OpenText is a financially secure, global company and the largest independent ECM vendor.



Summary

The enterprise fax server remains the cornerstone of any faxing environment because of its ability to integrate with business applications and provide a centralized hub to ensure documents are delivered, routed, and tracked in a secure, efficient, and reliable manner. As a transport mechanism, FoIP is a good option for organizations that want to compound the existing benefits of their fax server and maximize the payback from consolidating voice, fax, and data traffic on an IP network.

When it comes to implementing FoIP, market leading RightFax fax server is the proven choice for providing flexible, scalable, and cost-effective FoIP solutions. Known for integrations, reliability, and manageability, OpenText RightFax provides built-in FoIP options, making it easy to deploy, set up, and manage software, hardware, or combination FoIP solutions depending on an organization's needs. Organizations looking to consolidate resources reduce costs and reap the other benefits of using their IP infrastructure for faxing will benefit from scalability and flexibility of RightFax as their document delivery engine.

About OpenText

OpenText provides Enterprise Information Management software that enables companies of all sizes and industries to manage, secure and leverage their unstructured business information, either in their data center or in the cloud. Over 50,000 companies already use OpenText solutions to unleash the power of their information. To learn more about OpenText (NASDAQ: OTEX; TSX: OTC), please visit: www.opentext.com.

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