

White paper: The changing face of fax - FoIP and virtualization

Introduction

Fax machines have existed in various forms since the 19th century when a Scottish inventor, Alexander Bain, worked on chemical mechanical facsimile type devices and reproduced graphic signs in lab experiments in 1846. Since then, fax has gone through a variety of changes from wired transmission, wireless transmission, to the more traditional telephone transmission that has become a critical part of the communication infrastructure for many organizations. More recently, fax server software such as Zetafax from Equisys has replaced traditional fax machines, reduced paper usage and limited use of consumables, resulting in lower operating costs for many organizations.

With the advent of Internet Protocol (IP) technology, organizations have been able to consolidate communications over the data network. With more and more companies choosing to move to Voice over IP (VoIP) telephone systems or implement server virtualization, one question that often remains is: “what do we do with fax?”

This white paper therefore serves to explain what is involved in Fax over IP (FoIP), and how fax can be handled in an IP and virtualized environment. It also addresses the benefits to be realized by FoIP and server virtualization, and what you need to consider before, during and after implementation.

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What is FoIP?

Manual faxing

When people generally think of fax, they think of the traditional form of faxing, involving walking to a central fax machine, feeding a document into the fax machine, dialling the number and then sending the fax. As the document feeds through the fax machine, it is scanned by an image sensor that views the document as a series of black and white dots. The fax machine then converts these dots into different tones which can be sent across the public phone network (PSTN) using the T.30 protocol. This then allows the information to be received, decoded, and the document printed by the receiving device.

Fax server software

In more recent times organizations have deployed fax server software, such as Zetafax, which allows users to send and receive faxes directly from their desktop, or email application. This eliminates the need for fax machines, as well as cutting down on paper use and consumables, and increasing the efficiency of staff. Documents are sent to the fax server which then transmits the information down the telephone line to the receiving party, which could be a traditional fax machine, or another fax server.

Fax boards

In the past, fax servers had to be connected directly to the phone lines, using fax boards installed in the fax server computer. Although still a good solution in many cases, this imposes some restrictions on where the fax server can be installed, and often requires additional phone lines and cabling.

FoIP

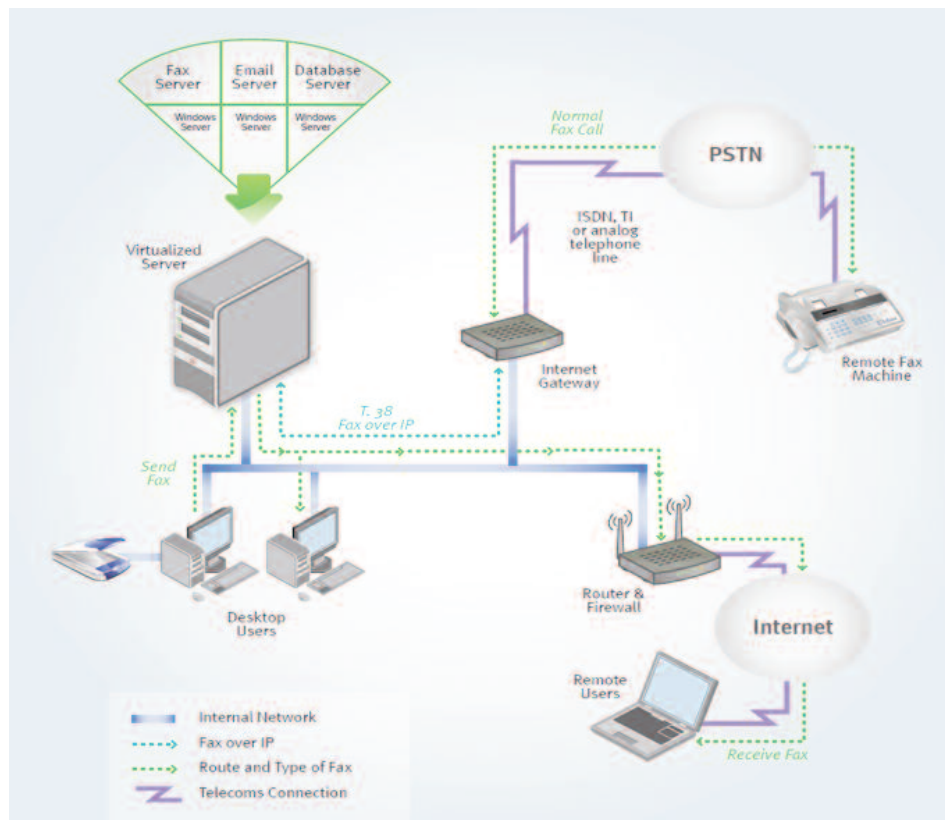
Fax over IP (FoIP) is a recent technology which enables fax data to be sent efficiently over an IP network, such as a company LAN, reducing the need for additional phone cabling.

FoIP eliminates the need for telephone lines to be connected to the fax server computer, which means that the hardware does not need to be located in the same server. It also limits the amount of hardware configuration that is required when moving the server to a different computer (e.g. for failover systems).

For IP transmission, there are two main protocols: T.37 which uses a 'store and forward' method of delivery; and T.38 which operates in real-time. T.38 is generally considered to be the preferred protocol as it is more akin to the traditional method of sending a fax: setting up the session, transmitting the fax, verifying delivery and then ending the session using active confirmations.

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Example of a fax server operating in a virtualized environment.



For sending faxes across the Public Switched Telephone Network (PSTN), however, the data must be converted from packets that use the T.38, protocols to the ‘squeaks’ that are transmitted over the PSTN (using T.30). If you have a T.38 compatible phone system, then the conversion may be completed by the IP-PBX. Alternatively, a separate IP gateway can be installed, connected to both the company LAN and the fax phone lines.

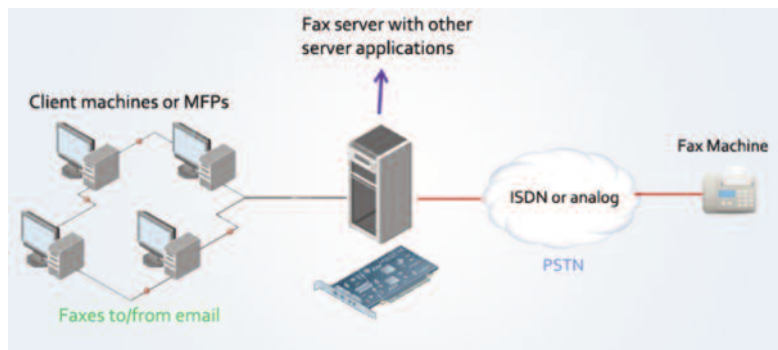
FoIP also enables server virtualization, ensuring that the server applications and their virtualized operating systems can access underlying hardware.

FoIP based fax servers

In a FoIP system, faxes are sent in a series of hops, rather like using stepping stones to cross a stream. The fax server sends data to the gateway (or phone system) over the LAN, using T.38. The gateway sends this on down the phone line as fax tones, just as a fax machine or computer fax board would. Confirmation messages from the remote fax machine are passed back via the same route. Unlike store and forward systems like email, this happens in real time so the fax server knows that the fax has been received successfully immediately.

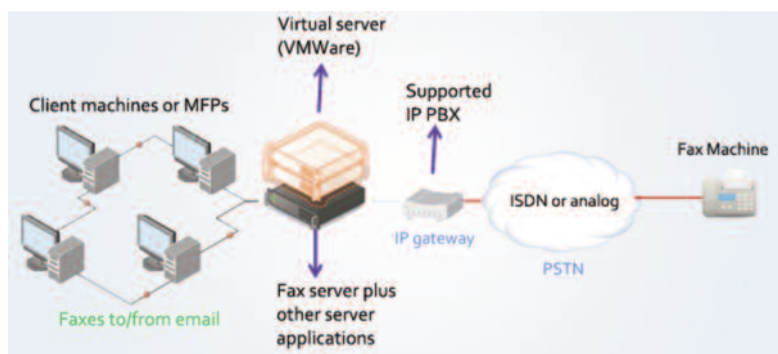
What is virtualization?

Server virtualization is the term used for the method of running multiple independent applications or operating systems on a single physical machine. It is used as a means of enhancing physical resources to maximize the investment in hardware, where the server administrator uses a software application to divide one physical server into multiple isolated virtual environments.



Before

Fax servers can be deployed in two ways. Firstly, by connecting the fax server directly to the PSTN through an analog or digital (ISDN) telephone line. This is done using fax hardware such as an intelligent fax board, ISDN controller or modem. This is a common setup in smaller organizations, where the fax server simply replaces one or more stand-alone fax machines.



After

In a virtualized environment, the server applications and their virtualized operating systems access the underlying hardware through a virtualization layer. Communications hardware is typically not supported in this virtualized world, and so FoIP must therefore be used, allowing faxes to be transmitted using the IP connection rather than the physical hardware.

A software-only device can therefore be implemented on the fax server, which typically integrates with an IP gateway on the network. The gateway is a device, similar to a router, that converts FoIP signals coming from the fax server to fax signals (squeaks) that are transmitted over the PSTN or telephone network.



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Server virtualization brings the possibility of sharing hardware between multiple server applications, with each application believing it is running on its own computer with no risk of one application causing another to fail. Disk intensive applications can be matched with CPU heavy ones in order to get the maximum out of each piece of server hardware.

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The benefits of FoIP and virtualization

Fax server software such as Zetafax brings a number of benefits to an organization, such as reduced long-distance phone charges through sending faxes via the network and Least Cost Routing (LCR), or integration with Multi-Functional Printers (MFPs). However, FoIP and virtualization can deliver some more specific benefits:

Reduced costs

FoIP and server virtualization can deliver a number of cost savings to an organization, including:

- Lower operating costs through consolidation of communications over a single data network. Utilising IP communication for both voice and fax removes the need for telephone cabling around the building.
- Substantial savings can also be realized from server virtualization when a hardware upgrade is already required. Some businesses are even accelerating their server replacement cycles thanks to the promise of lower on-going running costs from virtualized servers.

Easier deployment

By using FoIP, physical lines do not need to be connected to the fax server as the data can travel across the LAN or WAN network. This means that the fax server can be located wherever you like, without the need for extra phone connections or cabling to it.

Disaster recovery and reliability

FoIP allows the fax server to be deployed in a virtualized environment. This makes it easier to configure load balancing and failover as there is no longer a need to have duplicate hardware and communications links for each server. Instead, a communication server coming on line just picks up the relevant IP connections for its electronic messaging – usually automatically.

Compliance

Organizations with remote offices can face issues around regulatory compliance, with faxes kept locally at the relevant branch office. Using a central fax server connected over the IP network, however, ensures that all faxes can be archived centrally, yet still accessed by the relevant user as required.

Virtualization and FoIP benefits:

- Reduced costs
- Easier deployment
- Disaster recovery and reliability
- Compliance
- IP phone system integration
- Reduced carbon footprint



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IP phone system integration

With more and more organizations implementing VoIP telephone systems, moving fax across to the IP network is the next logical step. By using the IP phone system for faxing directly, you can save the cost of installing separate phone lines for use by the fax server. This also increases efficiency as lines can be used for phone calls or faxes, rather than having dedicated lines for voice and fax.

Reduced carbon footprint

Using a fax server software solution such as Zetafax greatly reduces an organization's dependence on paper and consumables for fax, and receiving and storing faxes electronically greatly reduces paper waste. FoIP and virtualization can then also reduce an organization's dependence on hardware to support their fax requirements.

FoIP Checklist

As with any change in an organizations communications infrastructure, there are a number of elements that should be considered before moving to FoIP:

- Examine your network – although the amount of data transferred with fax is low, fax transmissions using FoIP can be severely affected if there are significant delays or data loss on the company network. You should seek advice from a network specialist if your network has poor quality of service.
- Examine your current fax usage and infrastructure – examining your current fax usage and infrastructure can help you identify any improvements that you would like to make when moving to FoIP. Your fax software provider may also be able to assist in this process, identifying potential problem areas and suggesting further improvements to help further increase efficiency and reduce costs. For example, Equisys offers a Zetafax Healthcheck which serves to do exactly this.
- Research available options – Once you have ensured your network is capable of handling FoIP, and have investigated any improvements that you wish to make, you will need to research the solution that best meets your individual requirements. When choosing a solution, be sure to consider the following:
 - Functionality – ensure that the fax solution you choose fully supports the functions that matter most to your organization. Does the solution allow you to fax from existing email applications? Will you be able to automate key processes, or integrate fax into bespoke systems for the greatest return on investment? Also think about how your business is likely to develop, ensuring that the system will be flexible enough to grow in line with your business plans.
 - Usability – ensure that the system you choose is easy to use, encouraging use and minimizing training requirements.
 - IP phone system compatibility – If you have already implemented an IP telephone solution, make sure that the solution you choose will be able to integrate with your phone system. Alternatively, you can use an IP gateway to enable the fax server to communicate with the telephone system.
 - Support – ensure that the fax solution you choose is supported by local technical experts, or a fully accredited partner who is able to install, maintain and fully support the product.
- Plan and execute the implementation – your chosen solution provider should be able to assist you in planning deployment of FoIP to ensure minimum disruption to your business.

FoIP can be implemented using a T.38 compatible IP PBX, or using an IP gateway to ensure that faxes are successfully delivered and received.

Summary

Fax remains a vital part of business communications for many organizations. However, as more companies look to implement VoIP technology, reduce costs and reduce their carbon footprint, the standalone fax machine is losing its appeal. Fax server software, such as Zetafax from Equisys, therefore offers organizations a suitable alternative. From facilitating the receipt and delivery of faxes directly from the user's PC, through to integration with the latest email platforms, bespoke applications and MFPs, fax server software delivers tangible benefits to today's businesses.

However, as companies look to integrate their communications infrastructure over an IP network, or implement server virtualization, the need for FoIP is growing. In fact, Gartner predicts that the use of fax servers in the enterprise space will increase by as much as 80% by 2012¹, and Davidson Consulting predicts the FoIP server segment to show grow at a 39.2% Compound Annual Growth Rate (CAGR) through 2011² as more and more companies implement VoIP.

For most organizations, the move to FoIP is undertaken to satisfy one of two areas:

1. Integrating the fax server with an IP based phone system.
2. Implementing server virtualization, and wanting to extend this to the fax server.

Organizations therefore need a reliable, feature-rich fax server solution that will deliver the functions that their users need, whilst also receiving the investment that it requires to keep it at the forefront of new technologies.

About Zetafax and Equisys

Zetafax is the award winning fax server software from Equisys that delivers secure, fast and cost-effective document distribution. Simple to install, easy to manage and highly reliable, Equisys has a proven track record in providing businesses with complete fax solutions that generate real cost savings whilst streamlining their business processes. This is why Zetafax is the proven choice of fax server for over 60,000 customers in over 100 countries.

Equisys are committed to the ongoing development of Zetafax to ensure that the software is fully compatible with the latest Microsoft platforms, and supports the latest technology including FoIP and server virtualization. Also providing first class customer support, Equisys are therefore perfectly placed to assist you in all of your faxing requirements both today and in the future.

Equisys was founded in 1987, and has offices in London, UK and Atlanta GA, USA. Equisys also has an extensive partner network of distributors, VARs, resellers and ISVs that provide solutions across the world. For more information, please visit www.equisys.com/zetafax.

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On the whole, network fax server software comes out on top with a total of 9 out of 10 points.

¹ Gartner, "Tactical Guidelines for Reducing Your Fax Costs," March 2009

² Davidson Consulting, "Computer-Based Fax Marketing, 2006-2001," December 2007



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