

**There's life in the old
dog yet**

The paradox of fax

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Fax looks like a paradox: Most people think that it is an obsolete technology without any real significance in business communications today. However, the reality looks very different because fax still plays an important role in the exchange of structured, semi-structured and unstructured information even for the largest and most technologically-aware multinational enterprises. This article tries to shine some light onto this paradox, discuss in more detail where and why fax is still seen as an indispensable method for the exchange of business information and then takes a look at what the future of this technology might be.

Fax as a means of business communication has been said to be dead for more than a decade

Fax - An obsolete technology?

Fax as a means of business communication has been said to be dead for more than a decade. And there are some good reasons for this assessment:

- For many of us email has become a more convenient and easy way to exchange personal and business information
- Digital signatures, Public Key Infrastructures (PKI) and protocols such as https allow a secure exchange of information via the internet
- Web based applications provide online interfaces for keying in data which previously had to be mailed or faxed based on paper forms
- Methodologies and standards have evolved for exchanging structured information such as e.g. invoices or orders via a secure file exchange between businesses instead of sending them as letters, facsimiles, or email attachments

Given these technology innovations it is amazing how much fax is still used for business communications by small and medium sized companies as well as the largest multinational enterprises. Some examples taken from a study which INTERCOPE, a supplier of mission critical business communication solutions for more than 25 years, recently conducted among its customers illustrate this:

- An airline transmits information related to air traffic via fax including weather charts for the pilots, airplane loading calculations and diagrams for balancing the undercarriage weights for the airplanes. In addition fax has become the backbone of many back-office operations. In total 63,500 fax messages are processed each month by this company.
- A multinational chemical and pharmaceutical company uses fax services integrated with a large SAP infrastructure to send and receive 164,000 messages each month across most business areas served by the SAP applications.
- A large financial service provider processes 418,000 fax messages monthly solely in their SWIFT messaging infrastructure complementing international financial messages sent and received through the SWIFT network.
- An insurance group processes 468,000 fax messages each month through integration with their email infrastructure, large mainframe batch processes and SAP applications.
- A government agency processes 1,440,000 fax messages monthly relating to disability claims processes handled through one of the largest content management systems in the world.

Fax still plays an important role in the exchange of structured, semi-structured and unstructured information

Fax is often perceived as an obsolete, out of date technology which may still be used by some older people in small business who do not know better, but as irrelevant for the mainstream of business information which is expected to be handled by modern web based technologies, structured data exchange, and email. As the above examples indicate the reality is actually quite different and fax still plays an important role in the exchange of structured, semi-structured and unstructured information even by the largest and most technology-aware multinational enterprises.

A typical example is the usage of computer based fax in conjunction with printing systems

Computer based email to fax functionality

The vast majority of all users still see fax functionality as an indispensable component of their business communications

Who is sending millions of faxes these days?

Print data streams

With larger organizations the majority of fax traffic is no longer handled by individual fax machines but by fax server solutions providing tight application integration and allowing a high degree of automated fax processing. A typical example is the usage of computer based fax in conjunction with printing systems. Traditionally these systems physically printed thousands of letters, invoices and other types of documents, which were enveloped and sent by mail - a laborious, cost and time intensive process. A fax server using printer emulation technology can electronically grab these printouts, extract address information such as a fax number from the print data stream, convert the original message into the required TIFF fax format and send the information to the recipient in a fraction of the time required for mail delivery and for a fraction of the associated cost. In addition the successful receipt of the documentation can be verified and recorded automatically.

Individual business messages

After people became used to sending text messages and desktop documents as email it became somewhat cumbersome to print documents for fax recipients, collect the paper from a printer, fill out a fax form, dial and feed the paper into a fax machine. Soon computer based email to fax functionality became a popular remedy allowing fax messages to be sent transparently from the user via an email client. Advanced solutions automatically selected appropriate cover pages depending on the ID or department of the sender and could feed data into these forms from the email address book entries of the sender and the recipient such as "To" and "From" lines. In addition the sender could be immediately notified about the transmission results and react to failed transmission attempts.

Also for incoming fax messages email became a popular delivery medium. Today all enterprise fax solutions can determine a specific recipient for an incoming fax depending on criteria such as a dialed number or number extension and deliver the received facsimile automatically as an attachment to the mail basket of the recipient.

So today email to fax and fax to email is a widely used tool within a great many organizations. In the INTERCOPE customer study mentioned above the email interface is one of the most popular integration modules and is used by about one third of all users covered by the study. The fax volumes processed through email integration have decreased over the last few years mainly because more messages which were initially sent to fax numbers are now transmitted directly to email addresses. However, the vast majority of all users still see fax functionality integrated into their email system as an indispensable component of their business communications requirements due to the following factors:

- Customers request the delivery of specific information as faxes instead of email
- The delivery of critical documents may require fax delivery due to corporate standards and regulations
- Letter style documents with cover pages are required while attachments to emails are not acceptable.
- Fax transmission is real-time and difficult to tamper with

This interface is widely used in the fax server industry and enables individual SAP users as well as automated processes within SAP to easily send and receive fax messages

Enterprise Resource Management

A third relevant source (and destination) for fax messages employed in business processes are Enterprise Resource Management (ERP) systems such as SAP. SAP had quite early identified the necessity of integrating external communication channels into the business processes handled by SAP applications and developed a state of the art interface for such systems based on remote procedure calls (RPC) called SAPconnect. This interface is widely used in the fax server industry and enables individual SAP users as well as automated processes within SAP to easily send and receive fax messages as well as to trace the transmission status for outgoing messages.

Some 15% of all INTERCOPE customers recently reviewed are using the SAP fax integration functions. However the contribution to the overall fax volumes is significantly higher as the SAP installations typically process high message volumes from automated business processes. The following two examples illustrate the significance of fax processing for different areas of Enterprise Resource Management:

- A large hypermarket chain sends information by fax from SAP including orders for suppliers, pricing information, special offers and broadcast messages to the markets. These messages add up to more than half a million each month and volumes are continuously rising. Fax is a preferred medium of delivery for most of the recipients and attempts to use delivery by email have been given up after receiving very bad feedback from external suppliers as well as from the hypermarkets owned by the company.
- The financial service arm of a large car manufacturer built a Customer Relationship Management application based on SAP CRM, SAP Netweaver and other SAP components which provide customer advisers with all the data required to work efficiently on customer requests and enquiries at one glance. Data is accessed from various sources such as host based banking and contractual systems and the platform integrates all relevant communication channels such as phone, mail, fax, and email. As part of the overall communication flow this system processes some 700,000 fax pages each month.

The typical place where such content is handled are Enterprise Content Management systems

Enterprise Content Management

As described previously modern fax server solutions can route received fax messages according to criteria such as the dialed number or a dialed extension to mail baskets or users of ERP systems. However, when these documents are associated with specific business processes instead of individual users, this approach has its natural limitations. An insurance company could e.g. provide different fax numbers for car insurance, life insurance and health insurance. The company could try to further fine tune this approach by providing a specific dial extension for e.g. new appliances, claim related documentation and general inquiries. In practice however this will not work as intended since senders will often ignore or confuse such numbering schemes and a high portion of documents will end up in the wrong place.

Facsimiles is basically unstructured content in the form of images and this is hard to process automatically by means of software. The typical place where such content is handled are Enterprise Content Management systems designed to deal with unstructured text, images including facsimiles, audio and video data.

- A large government agency in the US handling disability claims stores mountains of claims documents for the millions of people who apply for disability benefits each year. Each claimant has a folder in one of the largest Content Management repositories ever set up in the world. One important source of input data for this system is fax messages sent by applicants, doctors, hospitals and other parties involved in the claims process. Each month 1.4 million fax messages are received and processed by this system.
- In insurance companies and in particular within claims handling the deployment of ECM systems as a basis for workflow driven business processes is widespread and inevitably involves large volumes of facsimiles in addition to other sources of documentation. An example is a company focusing on specialty products, such as mobile homes and motorcycles. In this company all information related to a claim is stored in folders in a Content Management application and is immediately to hand together with the customer record when e.g. a customer calls. Some 100,000 fax messages are received and processed each month.
- Credit card transactions are often sent from branch offices as facsimiles to specialized service providers. One of these companies in Germany automated the processing of these messages to a high degree by means of optical character recognition (OCR). The OCR component extracts all relevant data from the fax images and the fax server solution forwards this data in XML format to the workflow management system of the company where the actual transactions are executed. Some 40,000 transactions such as credit card applications, cancellations, blocking of cards, and various changes are processed each month using this architecture.

Customer written applications running under Windows or Unix

Distributed Systems

In 15% of all installations reviewed in the INTERCOPE study customer written applications running under Windows or Unix use fax services. Most typically these applications serve industry and customer specific requirements.

- The business of a leading mobile telecommunications company is based on extensive communication with customers by phone, email, fax, and web interfaces. This communication is handled by a proprietary application tailored to the specific business requirements. Fax processing is included in many processes such as e.g. invoicing, SIM activations, number changes, provision of billing information, and other aspects of customer interactions resulting in a monthly message volume of more than 300,000 facsimiles.
- A financial group serving more than six million customers with special focus on household accounts and small and medium enterprises developed a workflow application based on Microsoft SharePoint. Through a web service interface some 280,000 fax messages are processed each month as part of a highly efficient communication infrastructure.

The “legally binding” character of fax communications

Why is fax still so widely used?

Legal Acceptance

When you ask large fax users why they continue to use fax as a preferred communication channel one answer you will get - in particularly in the finance and insurance industry - is the “legally binding” character of fax communications . It is assumed, that fax guarantees the delivery of a sent message to the recipient based on the underlying point to point protocol. So if you successfully sent a fax, the transmission report printed by your fax machine or the delivery confirmation in your fax server solution should serve as legally acceptable proof that the recipient has received your document ensuring the non-repudiation character of the transmission.. In consequence fax is accepted by many companies as a way to send contracts and other legal documentation while it is not permissible to send these types of documents by email.

The fax format is much harder to manipulate than the character based content of email messages

Fraud Resistance

Users who stress the legal characteristics of fax also often mention that it is a more secure medium than email. Actually a non-protected textual email or editable attachment such as Microsoft Word documents can be easy to tamper with and even a format such as PDF can be manipulated with only a modicum of special knowledge whilst deploying readily available tools.

The main difficulty with manipulating fax messages arises from the point to point nature of the connection between the sending and the receiving party. All data is immediately transferred through the public switched telephone network (PSTN) without being stored temporally on other devices. A second argument for the more fraud resistant character of fax is the format in which the documents are transferred: Faxes are transmitted across the public telephone network in a graphical format called TIFF (tagged image file format) which literally encodes all data in bunches of black/white dots. This format is much harder to manipulate than the character based content of email messages and would require highly specialized skills and manipulation tools particularly in connection with the real time nature of the transmissions.

With email encryption, which can rely on public key infrastructures, an even higher degree of confidentiality and authenticity could theoretically be achieved compared with the security provided by fax. However, this technology has not achieved widespread adoption and is therefore not really applicable for the communications used by companies with hundreds or thousands of customers, suppliers and other business partners when compared with the already well-established fax communications.

Why replace a smoothly running document delivery system?

Established Service

Once a reliable and cost efficient fax service is established based on an enterprise fax server solution and well integrated into the application landscape of a company it becomes - like other successful technologies - resistant to change. Even if more advanced technologies exist the major question remains: Why should a company make major investments and take operational risks to replace a smoothly running document delivery system with a more complex and potentially more cost intensive new environment?

In only 5 of the 34 cases covered by the INTERCOPE study has fax transmission been partly replaced by either email delivery, Web based interfaces or structured data exchange. In each of these cases the driving factor for this change was either strong customer requirements or the very high processing cost related to the manual extraction of data form received fax images.

In other cases however fax volumes are still expanding due to one or more of the following reasons

- Increased business creating more messages
- Additional departments of a company, or companies of an enterprise appreciating the convenient and secure characteristics of fax and wanting to use the service
- Deployment of additional application integrations

People find it simpler and more convenient to dial a telephone number and feed paper into a fax machine

Working habits

While most users reviewed in the INTERCOPE study are large corporations with high fax volumes their correspondents include a significant number of small and medium-sized businesses. In these organizations the usage of traditional fax machines or standalone multi function devices is still widespread. People find it simpler and more convenient to dial a telephone number and feed paper into a fax machine instead of dealing with cryptic (and easily miss-spelt) email addresses and scanning and emailing attachments. This seems to correspond to the affinity for paper based work processes and the still overwhelming significance of document transmission by mail - in spite of the long promised move to the paperless office.

- A company specializing in the handling of credit card transactions offered their customers a new web based interface to key in the required data online for these transactions. However the acceptance was very poor and the vast majority of all transactions are still transferred by fax. Many of the customers using the credit card service are small branches of saving banks and their employees obviously feel more comfortable filling out handwritten paper forms instead of using computer based graphical user interfaces.
- The IT department of a large hypermarket chain tried to deliver information to the hypermarkets by email instead of fax. The results were massive complaints stating that this change would lead to more workload as now mailboxes would have to be monitored and the received documents had to be manually printed instead of using the intuitive process of just picking them up from the fax machine.

Fax over IP has an enormous potential to reduce communication costs

This architecture allows much more efficient use of hardware resources

No longer requires any fax hardware in the fax server solution

A new lease of life

Voice over IP

Today, most companies use conventional telephone networks (Public Switched Telephone Networks, or PSTN) for voice and fax communications, while IP networks are dedicated to data transfer involving file transfer, Web access, email etc.

By implementing Voice over IP (VoIP), the two networks can converge into one and companies benefit in many ways from having a single IP network providing voice and data services. In this scenario Fax over IP has an enormous potential to reduce communication costs, particularly in large organizations. Integrating fax servers with the IP network enables companies to simplify network management and to significantly reduce maintenance costs. The major benefits include:

- With FoIP faxes remain digital from end-to-end over IP networks, until they reach the PSTN endpoint gateway closest to the destination. This way, fax-related long distance costs are reduced to virtually zero. Internal faxes can be routed between branch offices without incurring any long distance call charges
- FoIP enables organizations that have already made investments in VoIP networks to break free from legacy PBX telephony and specialized hardware that traditional fax servers still require.
- Reduction of network management and maintenance costs with a single converged IP based fax, voice and data network.

Virtualization and Cloud Computing

A major trend in IT deployment is virtualization. Instead of assigning dedicated hardware resources to specific applications such as individual server machines, applications are deployed in virtual machines which share a common pool of hardware resources. This architecture allows much more efficient use of hardware resources, and the building of high availability service environments with minimum hardware requirements, leading to significantly reduced administration costs.

The virtualization of fax server solutions however has so far only been partly possible. To connect to the phone network or a PABX (Private Automatic Branch Exchange) fax boards are required which are not supported by virtual machines but have to be plugged into a physical machine. In a modular fax server solution which allows the distribution of individual components on different machines, the core of the system may be deployed in a virtual machine. However at a minimum the line server modules must run on the physical machine carrying the fax boards thus jeopardizing virtualization strategies.

With Fax over IP (FoIP) this limitation can be completely overcome as this technology no longer requires any fax hardware in the fax server solution but is based on pure IP communication and a shared network interface.

Mountains of fax pages

Legal considerations, customer requirements and a well established document delivery mechanism

Ongoing importance of fax technology for business communications in the st second decade of the 21 century

Conclusions and Outlook

In contradiction to the perception of many people fax continues to play an import role in business communications in the 21st century .

Mountains of fax pages are transmitted worldwide annually and there is no clear indication that these massive volumes have dropped during recent years, or should significantly drop during the coming years.

People in smaller businesses often still prefer to use a traditional fax machine or multifunction device to send business related messages instead of writing emails or dealing with email attachments.

In larger businesses high volumes of fax messages are sent and received by different business processes and handled through an enterprise fax server solution with the capability to tightly integrate into the application landscape of the company. Legal considerations, customer requirements and the existence of a well established and smoothly working document delivery and receipt mechanism are some of the reasons why the overall fax volumes have remained stable over recent years despite the availability of alternative, apparently more advanced communication channels.

For the next 5 to 10 years it is expected that fax will keep its position as one of the most important mediums for business communications. New technological developments such as a reliable Fax over IP implementation and the option to fully exploit virtualization strategies will bring new growth potential into the fax server market. Analysts such as Peter Davidson from Davidson Consulting predict that the Fax over IP server market will grow with annual growth rates of some 25% over the next few years. While medium size companies are already switching from conventional fax servers to FoIP, in large corporations these processes are more complex, need more time and are expected to happen during the next years. Virtualization, streamlining and centralizing of fax services and the integration of multifunction devices (MFDs) are further drivers for the ongoing importance of fax technology for business communications in the second decade of the 21st century.

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