



Exchanging Documents Within a Company

Fax Evolution for Business Processes

Technical White Paper 2017/10/04 | Ferrari electronic AG

The Situation

Businesses use various methods to simplify internal and external communication. Fax and E-Mail are the mostly used communication forms. Both are widely distributed and recognized but possess pros and cons alike. This technical White Paper outlines the importance of a functioning document exchange process and why fax is indispensable for certain processes.

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Why is a Functioning Document Exchange so Important for Businesses?

Companies need to communicate with customers, deliverers, and authorities regularly while simultaneously keeping the general law for exchanging business documents. Naturally, the communication costs are supposed to be as low as possible for both communication partners. Regarding purchase, training, update and maintenance the TCO (Total Cost of Ownership) of a fax device is considerably lower than that of a network computer. Many smaller companies with a limited technical infrastructure are located in certain sectors (such as within Logistic, Agriculture, Banks & Insurances and Retail). It is difficult to enhance their existent technology with fax. For them, fax has become indispensable.

Is E-Mail a Reliant Transport Route for Document Transmission?

Documents can be transmitted using various transport routes (Letter, E-Mail, fax, file transfer, web download etc.). All of them have pros and cons alike. Due to their broad distribution, direct addressability and almost instantaneous transmission, E-Mail and fax are the most dominant. Recent years has seen a shift from fax usage over to E-Mail usage although E-Mail has many disadvantages if incorporated into a business process. For example, E-Mail is:

- **Time consuming** (browsing the inbox daily through often irrelevant messages),
- **Unreliable** (delivery of messages is not properly assured and confirmed; Spam filters may suppress important attachments),
- **Vulnerable** (Attachments may contain macro viruses or may redirect users to phishing websites; Hence, it is prone to malware),
- **Usable on computers or mobile devices only** (not every employee is an IT expert),
- **Unsuitable for depicting processes on forms** (As E-Mail is commonly used for sending messages instead of sending documents),
- **Not always credible** (The originating E-Mail address may be chosen freely. This freedom introduces security threats due to faked websites),
- **Difficult to administrate** (configuring Spam- black and whitelists and creating Spam filters may cause configuration issues),

- **Only transmittable to counterpart stations that support IP** (hence, areas lacking Internet connections cannot be addressed),
- **Easily interceptable** (if conveyed without TLS),
- **Strenuous archivable** (Archiving documents for HGB -German commercial code- relevant communication is legally regulated. The same usually applies to other countries),
- **Inconsistent** as the display of banners, images etc. may differ between mail clients,
- **Not acceptable in court** as disputes over contracts, cancellations etc. are not legal in the form of E-Mail.

Many business models are abused by criminals (Businesses tend to deliver their E-Mail content via bulk mails. Thus, criminals may take advantage of this and design their vicious content to match their corporate identity. Users may not spot the difference between both messages and treat them as Spam. Newsletter mailings are often not even read but deleted along with other Spam E-Mails). Considering all this, is it wise to forward fax messages to E-Mail inboxes and literally throw the needle into a haystack? It is wiser to maintain a clear separation of important documents (Contracts, offers, invoices, studies, concepts etc.) from unimportant messages (Newsletters, office mailings, Spam, CC-addressed messages).

As E-Mail has a monumental degree of dissemination, computer fax solutions possess interfaces, which links them to E-Mail systems. Although the fax of today lacks many of the disadvantages found in E-Mail, it is not ideal and could potentially be improved.

How Does an Idealized Transmission of Documents Look Like?

It is important to comprehend the difference between an Office file, a text and a document. The content of an E-Mail is considered a text that, depending on the client, can be formatted variously and may sometimes not be visible due to a suppressed reloading of HTML content or alien fonts. No contracting party would accept an E-Mail as a form of contract; this is where a document is needed. A document is formatted statically and its content is put onto physical pages, which may be enhanced with the initials of both contracting parties. Once an Office file has been freed from active content (Macros) and put into a non-editable or at least not easily editable format (commonly via PDF export), it may also be considered a document. Content on a digital document should also be readable over a prolonged period. However, with common Office formats, this comes

in expense of quality. In the worst case, documents may not even open after a couple of years. PDF/A is a standardized format for a long-term filing of electronic documents and a sub-set of PDF 1.7 (ISO 19005-1:2005, ISO 19005-2:2011). This standard prohibits the use of all PDF elements that require external references (fonts, hyperlinks etc.) or active content. Hence, the ideal document is a PDF/A file with embedded fonts and images. Such a document may safely be sent as E-Mail attachment. Depending on the system, there is, however, no certainty that the document has been transmitted successfully. Spam filters tend to omit E-Mail attachments and there is no reliable confirmation note issued. Moreover, the user interfaces of many E-Mail clients are not fitted for sending or receiving these attachments, the user often forgets to add it to an E-Mail and saving an attachment is done manually; which in turn comes in expense of time.

What Benefits are There to Using fax?

Fax is an easy and popular method for exchanging documents from one endpoint to another. Various verdicts have been pronounced that made fax more legally secure. The validity of a transmission protocol for fax is now as conclusive as a certificate of successful delivery. Hence, fax may be used just as a letter with a return receipt, which is a huge benefit for users. Fax continues to be a widely used technology- even in areas without Internet connection people are still able to receive faxes. Slow modulation patterns and error correction modes ensure that users with poor telephone lines can still utilize fax.

What Disadvantages are There to Using fax?

A classic fax breaks down a document in dots and pixels and transmits these. As a result, the original text or character appearance gets lost. Programs such as OCR (Optical Character Recognition) are capable of retrieving their content and make them readable again so that computers can further process faxes. However, this technology is rather complicated and errors may never be excluded.

A "fine resolution" (200 dpi) for modern documents is not optimal as they may appear grainy.

The transmission speed of fax is dependent on the modems used. One page requires approximately half a minute for full delivery. This time, however, may greatly increase. Sending multiple pages can therefore be quite time-consuming.

How do I Improve the fax Protocol and Eliminate the Disadvantages?

It is advised to improve the fax protocol evolutionary. By doing so, classic interfaces are always addressable (backward compatibility). Listed below are three recommendations that endeavor to strengthen the fax ecosystem and improve the delivery of faxes for users. Needless to say, both counterpart stations (addressor and addressee) need to be capable of executing the respective feature.

1. Exchanging PDF Source Documents (T.434 PDF transfer)

Standardizing faxes by the ITU (International Telecommunication Union) has brought up an array of special possibilities for transferring documents. However, many of those have not yet found global distribution. One of them is BFT (Binary file transfer) according to T.434, which may be used to transfer PDF source documents. Once applied, users will no longer be required to resort to OCR. Higher resolutions as well as colored (and even three-dimensional) depictions are also supported and PDF files convert the document content very pleasingly. T.434 conveys these documents without quality loss. This protocol also supports a computer-based processing of invoices according to ZUGFeRD (German: Zentraler User Guide des Forums elektronische Rechnung Deutschland; Central user guide of the Forum for electronic invoices Germany).

2. Improving the Transfer Speed for VoIP Networks

Once the conversion of ISDN to VoIP has taken effect, there is a high chance that both communication endpoints are connected via an End-to-End IP line. T.38 is a common transfer protocol for IP networks where data that would originally be routed via a modem is sent through the IP network in unmodulated form instead. In order to enable a modulation at a later point, it is critical to maintain the transfer speed of the modem (on a transition point to a classical phone line). If, however, both fax devices communicate directly via T.38, the transfer speed may be greatly increased. Tests have shown many counterpart stations that support T.38 actually delivered document data in a much faster speed than originally expected upon implementation. Undoubtedly, the decrease of transfer time will elevate the acceptance of fax, particularly if a multi-page document is sent within one minute instead of one hour (Facts are taken from a test result using this technology).

3. Signalling of Alternative IP Routes

Fax devices connected to a classic telephone endpoint that possess an additional IP endpoint lack the address information for their IP port and the calling number of the respective device contains no information for that purpose either. According to T.30, a fax device may, however, convey a URL (Uniform Resource Locator) if transmission is accomplished via V.21 signaling. This URL may be an address that supports a transmission via SIP /T.38 or file transfer and essentially circumvents using classical phone lines (circuit-switched). The outbound fax has two choices: Ignore the URL information or alternatively hang up and commence communication via the URL.

The indicated extensions (which, except for T.38 fast, have all been standardized by ITU) allow for a quick, reliable, backward-compatible and errorless faxing in an IP environment while retaining the depiction of text. The universally appreciated benefits of fax (such as legal security, possession of document properties, eligible transmission protocol, end-to-end confirmation, etc.) can be retained. Furthermore, by coupling it with other transmission methods such as E-Mail, their benefits (high acceptancy, availability etc.) can be enjoyed as well.

In What way Does Enhanced fax Benefit the Company Processes?

Nowadays, an abounding amount of companies utilize fax for critical processes. The sender resorts to forms containing processes for orders, complaints, logistics, inquiries etc., whereas the receiver uses OCR or manual data capture to process the incoming information. The sending party requires no advanced technology; merely a common fax device. As the receiving party aims at capturing the content of a document as thoroughly as possible and forwards it to the respective department, it is advised to replace OCR by a program that extracts text directly from the PDF source. This will essentially decrease the risk of errors. In Germany, the Arbeitsgemeinschaft für wirtschaftliche Verwaltung e.V. (English: syndicate for economical administration), which is funded by the federal ministry of economics and energy, has released a format for processing electronic invoices that eases the exchange of documents between enterprises, authorities and users. This format attaches XML data to the original PDF file that contain details about the invoice, thus allowing machines to process them autonomously. ZUGFeRD version 2.0 is due to be included as CEN (French: Comité Européen de Normalisation) EU

standard. PDF ZUGFeRD invoices may be exchanged via the T.434 protocol if they are sent as fax. This method automatically introduces backward compatibility: Users with a classic fax device receive a copy of the invoice whereas modern devices supporting T.434 receive a PDF enriched with XML data, which they process automatically.

Utilizing fax for transmitting PDF invoices is an attractive option for businesses:

Providers for accounting software are capable of creating accounting records based on electronic invoices. Therefore, it is important that these PDF attachments can be forwarded directly to the respective systems (after being detected as invoices by the fax server). Due to that, fax is an important solution for use as B2B interface.

Business communication is subject to the law on safekeeping defined by the commercial code:

As fax can be saved as a PDF/A file and fed to a document management system, legal business processes can be worked out and ultimately kept. All of which would not have been manageable with flexible systems such as E-Mail (for E-Mails may contain an external HTML which possibly cannot be reloaded/restored after a couple of years).

Multi functioning devices have proven to be a pivotal cornerstone for document transmission in various businesses.

Hence, they ought to support modern fax solutions and convey PDF's transparently. If they do, the basis of the installed fax devices can be gradually replaced while broadening the distribution to IP-fax supporting counterpart stations (IAF devices; Internet Aware Fax devices).

Will fax Continue to Work as Usual After Moving from Classical Telephony to VoIP?

Fax utilizes robust modem procedures (V.21, V.27ter, V.29, V.17, V.34) that maintain a high transmission quality even on analogue routes with a low signal-noise ratio. The Error Correction Mode (ECM) automatically detects and corrects errors in the fax transmission process and may be used as well. Unfortunately, media transitions between circuit-switched (ISDN) and packet-switched (VoIP) telephony regularly cause problems due to three issues: As there is no synchronous phase existent between the sender and receiver, an overflow or underflow of jitterbuffer may result, which in turn disrupts the transmission over a modem. Package losses within the IP network may also

occur and obstruct the modem transmission. Various methods exist that either reduce the bandwidth for VoIP (such as audio compression; Silent oppression) or improve the audio quality (Echo Canceler), however, they all distort the modem signal. For that reason, a "Voiceband Data" route via SDP (session description protocol) needs to be utilized for a G.711 clear path VoIP transmission.

Resorting to T.38 for fax transmission solves these three issues. T.38 compatible gateways operate synchronous to the network and the Forward-Error-Correction mode (FEC) minimizes the effect of possible package losses. Silence suppression, Echo Canceling or audio compression are non-existent in the T.38 protocol. Unfortunately, many T.38 implementations often do not support the features like ECM and network providers tend to eschew investing in T.38 gateways. For example, even if both counterpart stations support T.38, the Deutsche Telekom would support T.38 only passively. In this case, the network provider wouldn't have to convert from T.38 to G.711 but merely forward the IP packages.

As technicians and IT administrators rarely touch upon the topic of fax, the correlation and cause of errors are often not clear to them.

In Germany, the transition between classical telephony to VoIP is rather short, which is why there is only a short concurrent operation of both networks. Usual package losses that occur on the transition of the two networks are therefore fixed to

the time of concurrent operation only. IAF devices (Internet awareness fax) are capable of transmitting fax through IP lines. The T.30 protocol has long since defined one bit and fax devices can utilize this to label them as "Internet aware".

T.38 and faxing through the Internet has opened up many possibilities while retaining its backward compatibility to older fax devices. In order to enhance the use of IAF devices, the installed basis often needs changing, thus providers of IP PBX's should not hinder the transmission of T.38 packages.

The Conclusion

- Businesses utilize mainly E-Mail and fax for transmitting documents from A to B
- Neither fax nor E-Mail possess the required functionalities that safeguards communication in a VoIP environment. Fax has issues in reliance and E-Mail lacks professional validity.
- The suggested adjustments covered in this document enhance fax and introduce many advantages to E-Mail. Requirements and aspirations to reliant and legally safe document transmission are therefore fulfilled.

About Ferrari electronic

Ferrari electronic is a leading German manufacturer of hard and software for Unified Communications. The OfficeMaster range integrates fax, SMS and voicemail into all existing E-mail and application systems. The hardware seamlessly connects a company's telecommunications infrastructure with the existing information technology. Customers benefit from greater efficiency and streamlined business processes.

In August 2014, Ferrari electronic acquired innoventif Ltd. and thereby expanded their portfolio by the OfficeMaster **CallRecording** solutions. Thus call recording becomes an integral part of Ferrari electronic Unified Communications solutions. Companies can optimize their sales department, service quality and other processes with a wellrounded system. With this move, Ferrari electronic gains new opportunities, customers gain additional value. Research, development and support of Ferrari electronic AG are located entirely at the company's headquarters in Teltow near Berlin. A pioneer in computerfax since 1989 with the product „ferrariFAX“, Ferrari electronic remains market and technology leader in this area to this day. Today, more than 50,000 companies with approx. 5 million users utilize Unified Communications products by Ferrari electronic. The customer base includes companies of all sectors and sizes. Some of the more notable companies include Allianz Suisse, Asklepios Kliniken, Boehringer Ingelheim Pharma GmbH & Co. KG, EUROVIA, European School for Management and Technology, Griesson - de Beukelaer, Österreichische Kontrollbank AG, Stadthalle Wien and Techniker Krankenkasse.

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