



# Electronic Document Exchange Using Fax

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This document serves as a guide as to how fax can be used to enhance the automatic procession of documents while using a reliable end-to-end transmission protocol

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# The situation

In Business to Business marketing (B2B) the need of transferring documents safely has risen in recent years and particularly since the move to All-IP. Well-established transmission methods (E-Mail, Fax, letter etc.) have been heavily challenged and these methods have shown to occasionally lack in security. This document serves as a guide as to how fax can be used to enhance the automatic procession of documents while using a reliable end-to-end transmission protocol. Furthermore, this document also pinpoints the relevant legal status and requirements.

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## Fax: Old, yet Contemporary

The way enterprises communicate has changed and is still in the process of doing so. Apart from the obvious technological point of view, the need of exchanging documents from A to B has never ceased to be a top priority. Companies need to communicate with customers, deliverers and authorities within the bounds of legal requirements. Furthermore, both communication partners expect a reasonable expenditure and swift process. A common fax device has a much lower TCO (Total Cost of Ownership) than a computer with Internet access (in terms of acquisition, training of employees and update and maintenance expenditures). Many smaller companies with a limited technical infrastructure are located in certain sectors (such as Logistic, Agriculture, Banks & Insurances and Retail). For them, fax has become indispensable.

At the same time, the use of automated document procession is gradually increasing as ERP systems offer the option to communicate automatically with each other and operate process-driven. Companies desire to post invoices and forward documents to other parties, preferably on an automated basis. As a fax is not capable to deliver a document in its default resolution or format but in a 200 dpi bitmap image, it is considered unfit for document transmission where an unaltered resolution is pivotal. If these faxes are yet required to be processed automatically, the common text extraction method cannot be utilised and one needs to resort to OCR (Optical Character Recognition) with its respective susceptibility to faults.

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## Document Properties

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

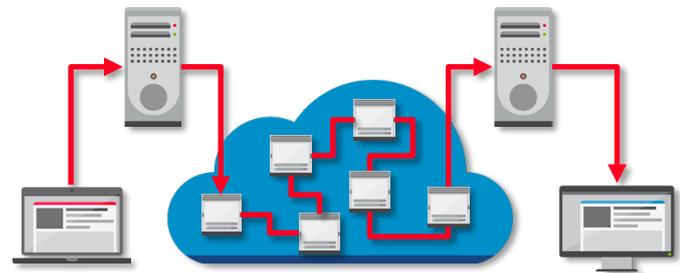
content. Hence, the ideal document is a PDF/A file with embedded fonts and images.

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.

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## Qualified Transmission Protocol and End-to-End Confirmation

Both the issue of a confirmation of successful delivery and a transmission journal becomes increasingly important the more critical the conveyed message is. A protocol that won't communicate directly with the counterpart device will never receive a direct delivery notification from the latter. The use of protocols which are based on



E-Mail

client server- or federated architectures are therefore unsuitable.

Only protocols that address the counterpart device directly are capable of issuing a confirmation of successful delivery (e.g. peer-to-peer architecture).



Fax

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## Transport Routes for Document Exchange

Various transport routes (Letter, E-Mail, fax, file transfer, web download, E-letter etc.) may be used for exchanging documents between parties. All of them possess their own advantages and disadvantages. Due to their global

distribution, speed and capability of direct addressing, E-Mail and fax are the most prominently used forms of business communication. However, recent observations showed a shifting from fax to E-Mail, although the use of the latter holds many disadvantages such as its

- Time consumption (browsing the inbox daily through often irrelevant messages)
- Unreliability (delivery of messages is not properly assured and confirmed; Spam filters may suppress important attachments)
- Vulnerability (Attachments may contain macro viruses or may redirect users to Phishing websites; Hence, it is prone to malware)
- Unsuitability for depicting processes on forms (As E-Mail is commonly used for sending texts instead of sending documents)
- Limited credibility (The originating E-Mail address may be chosen freely. This freedom introduces security threats due to faked websites)
- Transmission limits (E-Mails may only be conveyed to parties that possess an IP infrastructure)
- Simple interception (if conveyed without TLS)
- Strenuous archivability (Archiving documents for HGB -German commercial code- relevant communication is legally regulated. The same usually applies to other countries)
- Abuse of business models 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).

Due to the much broader distribution level of E-Mails, various computer fax solutions offer various interfaces to mailing systems. Fax lacks many of the listed disadvantages of E-Mails, making it one of the most used communication forms up to date, despite being a rather old technology. However, even the fax as we know it today is not ideal and could potentially be improved. Major disadvantages of fax include

- Often slower transfer times
- Loss of information (source document is rendered to approximately 200 dpi and conveyed as bitmap file)

- Limited reliability in times of All-IP conversion (Modems and Echo Canceled may cause more package losses after switching from analog/ISDN to IP communication)

Despite these disadvantages, the issuing of a legally valid delivery confirmation is the biggest advantage to E-Mail. Moreover, fax can never be infiltrated with viruses, as no active content is projectable. By improving the fax protocols, the disadvantages of fax may be reduced even further.

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### Recommendations for Improving the fax Protocol

It is advised to improve the fax protocol evolutionary. By doing so, classic interfaces remain addressable (backward compatibility). Listed below are four 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). Ferrari electronic has prototypically implemented and tested the transmission of PDF's via T.434. Transmission via IP (G.711 or T.38/UDPTL) and transmission via classical modems (T.30/V.17/V.29/V.27) are both supported.

#### 2. Improving the Transfer Speed for VoIP Networks (T.38 fast)

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 (Forwarding to a URL)

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. This form of communication is similar to WhatsApp: While WhatsApp uses the phone number for a distinctive identification and validation of the customer's identity, fax devices use both the fax number and its availability in the telephone network for identifying user if a new data transmission channel is utilized.

### 4. Incorporating new Devices Into the fax Ecosystem

For IP telephony, the fax protocol may be implemented as a single software function, which essentially allows for an incorporation of fax devices to an existent infrastructure. Any web browser supporting HTML 5/ Javascript is capable of sending and receiving Web-RTC fax data and perform SIP signaling via Websockets. An app for iOS or Android may process faxes without the need of a hardware. Using the right software, multifunction printers employ SIP to transmit faxes without the need for a separate fax hardware controller. Any suggestions of fax improvements that had been outlined above may be applied to these implementation forms. Ferrari electronic possesses a software that contains a respective fax protocol stack.

#### In Summary

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.

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### 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.

Sending faxes through an ERP system poses an attractive approach to autonomous document processing. If the receiver is equipped respectively, his system may handle the document without him having to actively take part. A prerequisite is, however, an uninterrupted forwarding of these files to the respective systems (once the fax server has recognized them as invoices). Fax therefore plays a compelling role as B2B interface.

The commercial code regulates storage periods of business

communication. 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).

### About Ferrari electronic AG

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 email 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. Ferrari electronic with this move 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.

### Contact Information:

**T** +49 3328 455 90

**F** +49 3328 455 960

**M** info@ferrari-electronic.de

### THE VISION: FAX OVER IP

[www.ferrari-electronic.com](http://www.ferrari-electronic.com)

#### ADDITIONAL INFORMATION:

Please refer to the following White Paper for additional information on the topic of document transmission via fax.

#### The Validity of fax Over IP



#### Using fax for Business Operations



#### Exchanging Documents within a Company

