

# Blockchain- Verified Document Exchange

Next Generation Document Exchange  
– NGDX –

Enjoy the simplicity of an E-Mail and the legal security likely  
to that of a notary visit

## Management Summary

Companies, authorities and organizations require verifiable communication methods. The easy manipulation of digital documents and transaction data creates challenges to the advancement of digital transformation. However, Next Generation Document Exchange (NGDX) provides new possibilities and use case scenarios. Some benefits include cost reduction, risk minimization and productivity growth due to a simplified digitization of organizational processes that not only maintain the high level of trust between both parties but also comply with legal security.

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## 1. Blessing and Curse of Digital Documents

“Did we really order it?”, “Who has confirmed this date of payment?”, or “Is this the final version of the contract draft?”. These are commonly asked questions within a company. They also apply to the following statements: “You have not canceled the contract within the cancellation period.” or “We have never received this dunning notice”.

### The Problem:

Digital content can be created, edited and transmitted very easily. For example, a picture can be shot, sent and edited within seconds. Similarly, digitization has greatly accelerated business life. The great strength of digitization is also its greatest weakness: On its own, it cannot uphold any legal security if it comes to communication between organizations. How much simpler is it to retroactively edit a few digits in an offer or invoice than edit a picture? The manipulation of digital content can hardly be proven, even with high forensic effort. Likewise, it cannot be fully confirmed that the content was transmitted successfully.

Many industries and occupation groups face these challenges: Authorities often demand that original documents must be handed in via post. Lawyers cannot use the digital transmission channels as they cannot prove deadlines were met. Traders must save up provisions in case of disputes with suppliers. Financial service providers also need to set up provisions in case of disputes with their customers.

The regulation that requires the archiving of business letters can only mitigate these difficulties but it may not fully dispose of them. Companies usually observe the archiving requirement by implementing badly documented processes and expensive WORM (Write-once read-many) storage systems. Despite the high effort, they only verify and audit the own inbox/outbox. These systems do not solve the issue of whether documents have been exchanged successfully.

## 2. Digital Trust Thanks to Blockchain

The Blockchain technology offers entirely new possibilities: For the first time, digital content can be checked and permanently proven. Thus, they become non-exploitable. Blockchains generate digital trust and allow new possibilities for collaboration beyond industry boundaries.

These Blockchain-verified systems deposit transactions in a decentralized and redundant manner and essentially link them to existent transactions, that is, to other “blocks”. Every computer (“Node”) possesses a copy of that Blockchain, ensuring that the entire transaction history of that particular user is accessible.

Changing a character within the blockchain would yield in a divergent check sum. It would be easily spotted among the correct versions stored on countless other nodes. Thanks to Blockchain, all nodes agree on the currently valid version.

### Use Blockchain and enjoy these fundamental benefits:

- Traceability – Every transaction is traceable.
- Transparency – A blockchain is accessible to anyone.
- Security – Information is protected against manipulation.
- Efficiency – The exchange does not include intermediate instances.
- Auditability – Every information and transaction is verifiable.

These prime benefits provide new prospects in every area where the verification and deposition of digital data is pivotal. Therefore, typical fields of application include the medical sector, government work, legal activities etc. As of now, those industries have had difficulties with exploiting the full potential of digital transformation. However, companies of other industries also call for a traceable method to deposit their critical documents.



**STEPHAN LESCHKE**  
**CEO**  
**FERRARI ELECTRONIC AG**

A Blockchain-verified document exchange is just like a certified mail with return receipt. It's even better: One can now prove its content.

### 3. Blockchain and the Business Document Exchange

First and foremost, let us answer the following question: "What is a document?". In context of document exchange, a document consists of files that are put into a formatted text, is free from active content, is in a non-modifiable or difficult to modify form and ensures long readability. A common format for these kind of documents is PDF/a. PDF/a is an ISO approved format for long-term archiving of electronic documents. It avoids the use of external references such as hyperlinks and active content. Files with these properties are ideal for contracts or other arrangements.

Next Generation Document Exchange (NGDX) is a solution that transmits those documents without quality loss. It also issues a confirmation that the entire document has been transmitted successfully. Whoever wants to further increase security can utilize the integrated option, which verifies both the document as well as the transmission route: Blockchain-verified document exchange.

The Blockchain never includes the document itself nor other, productive and machine-readable data.

It merely contains hash values (checksums) generated from the actual document and transaction. Whoever has access to both the original document and the transaction, can in turn also generate a hash value. If both hash values are identical, the document has not been tampered with. Thus, hash values confirm the genuineness of a document. However, it is impossible to "extract" information of the original transaction from hash values. A hash has always the same length, regardless of whether the transaction behind it consists of a multi-volume book with tens of thousands of characters or just a few. Thus, no one can determine if a text, a picture, an invoice, an order or something entirely different is behind the hash. The slightest character change within the original document yields in an entirely different hash value. Due to this fact, a confirmation stating a transaction was performed in a particular fashion can be issued only once. If two hash values do not match up, it is obvious that something has been changed. It cannot, however, be determined what has changed exactly.



**CHRIS HELBING**

**DIRECTOR PRODUCT MANAGEMENT, FERRARI ELECTRONIC AG**

The Blockchain is a disruptive technology and is likely to become a hot topic in 2019. Nothing beats using the Blockchain for legally compliant document exchange. Whenever a discussion is about importance and traceability, the blockchain-verified document exchange is always the right choice.

#### 4. Next Generation Document Exchange in Action

The necessity of a traceable and unmodifiable digital communication solution is evident. E-Mail had never fulfilled this necessity. Also, there has never been a solution that proved satisfactory. With NGDX, Ferrari electronic introduced a solution that can now transmit verifiable and unmodifiable PDF/a documents. In cooperation with the Blockchain specialist Cryptowerk, the company has created the world's first Blockchain-verifiable document exchange procedure. The concept as well as the application itself is straightforward.

##### From a Sender's Perspective:

- A user can send a document straight from his E-Mail program, such as Outlook.
- The NGDX platform generates an archivable PDF/a from these E-Mails and also integrates configured templates for the appropriate stationery.
- Transmission begins as soon as the receiving system confirms that it is capable of receiving the document.
- The receiver obtains the unedited document in its original formatting, e.g. colored font or embedded pictures.
- The NGDX platform obtains a confirmation of successful delivery including date and time of transmission.
- When utilizing the Blockchain option, the NGDX platform writes all hashes generated from content and transaction into the preconfigured and public Blockchain.
- Automatic processes such as entering the information into databases and ERP systems as well as initiating a production- or delivery process further enhance the NGDX feature.
- Depending on the configuration, users receive a separate E-Mail for delivery confirmation.

##### From a Recipient's Perspective With NGDX:

- The recipient receives the document as PDF/a right within his E-Mail client (e.g. Outlook)
- The recipient can process the document manually.
- With Blockchain, the NGDX platform generates hash values from the content of the document as well as from transmission information. It checks whether the content has been received completely and without any manipulation. It then accumulates the public Blockchain selected by the receiving company with hash values for content and transaction.
- Document exchange systems are also capable of capturing documents automatically, extract their content as well as initiate subsequent job processes.



Ferrari electronic is well acquainted with secure document exchange. The long-established company has revamped the fax technology and its specific benefits for B2B communication, essentially preparing it for the new digital age. Innovative services such as computerfax, fax over IP and the seamless fax integration into both, Unified Communication environments and business processes are based on the research and development of Brandenburg specialists. Inspired by the unprecedented benefits that E-Mail possesses over fax (such as the confirmation of successful transmission), Ferrari electronic spent the past 25 years focusing on further developing the legally secure document exchange for businesses.

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**From a Recipient's Perspective Without NGDX:**

- Depending on the target system, the recipient receives the document either as electronic fax or as paper fax.
- The recipient can process the document manually.

**From a Neutral, Third-Party Perspective:**

- In case of a dispute or during audits, uninvolved third-parties such as auditors, lawyers or judges can evaluate NGDX transactions just as simple as a certified mail with return receipt or a transmission confirmation of a fax.
- With the Blockchain option, information provided by NGDX users can be doubtlessly confirmed. The technique behind this confirmation process is easily comprehensible, even by non-professionals.
- Hash values generated from a document and transaction can be easily recalculated using the information provided by the sender or receiver. If these "new" hash values match those stored to the Blockchain, the information is correct. Thus, it is an unambiguous proof that documents have been sent and received in accordance with the information provided and that they have not been tempered with between sending and receiving.
- Without input information, the public Blockchain never reveals any transaction details. In fact, it is impossible to conclude whether the hash values were made up of pictures, texts or transactions.

The Blockchain-verified document exchange greatly simplifies the act of archiving invoices, contracts, certificates, receipts, tax-relevant documents along with their transaction data. As mentioned further up top, these archives are verifiable and, from a legal point of view, have been approved as evidence in court. Ferrari electronic offers NGDX and the Blockchain option from the first quarter of 2019. It will be an update of the well-established Unified Messaging solution OfficeMaster, which is already being used by about five million customers in 50,000 companies.

**Top Features of NGDX**

- Transmits original PDF/a files
- Transmits the full PDF/a content, including color, meta-data etc.
- Transmits hybrid documents – Readable by humans and machines
- Does not transmit potentially harmful active content, such as hyperlinks or applications
- Provides peer-to-peer transmission via the telecommunication infrastructure
- Issues a confirmation stating the complete and unmodified document has been received successfully
- High transmission speeds
- Provides machine readability and the possibility of text extraction
- Provides the possibility to integrate into internal business processes, such as ERP systems
- Downward compatible to fax
- Provides possibility of transmitting large documents, such as large-format architectural drafts or design plans

**Additional Benefits of the Blockchain Option**

- Provides provability of both, the transaction and content of communication
- Data security and data privacy: The Blockchain consists only of hash values, never the actual transaction or document information
- Implements legal security for cross-company business processes, such as within supply chains

**5. Use Case Scenarios for a Verified Document Exchange**

The following section demonstrates the positive and versatile effect of NGDX in combination with Blockchain verification within certain branches:

**Logistics:**

A forwarding agency can digitally process their received transport orders as well as orders awarded to their sub-contractors without media discontinuity. Furthermore, they can legally and seamlessly verify these orders. This reduces administration effort immensely.

**Commerce:**

A food manufacturer can automatically check orders, extract data, add entries to ERP systems and ultimately forward the order processing to warehouses all across Europe. Hence, orders can be processed at a much faster pace and even require less personnel.

**Financial Services:**

Now a private bank can prove, without doubt, that it was commissioned to purchase shares. This effectively reduces provisions for disputes with customers by more than 50 percent.

**Public Sector:**

A municipal authority can seamlessly prove they have processed transactions legally and on schedule. They can also verify the content of transmitted documents, certificates and records at any given time. All processes that previously required physical paper can be digitalized.

**Construction:**

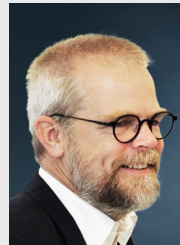
A project manager for a large, public construction project can prove precisely if and when craftsmen and construction companies received what kind of project/construction plan.

**Law:**

A law firm for business law can prove that it has honored appeal or revocation deadlines.

**Service Contractor:**

A personnel service provider can fully prove that a job assignment has been placed, even if the client appoints a new project manager and the previous contact person has left the company.



**BERNHARD HECKER**  
**VICE PRESIDENT BUSINESS DEVELOPMENT EUROPE, CRYPTOWERK**

I believe in a future where trust can be implemented into every digital product, every digital process and every digital transaction. Many branches eagerly waited for a product that was capable of exchanging documents and provide verifiability.

**Manufacturing:**

A manufacturer of electronic components converts his accounting to electronic invoices in a ZUGFeRD format. These invoices are predominantly created and processed automatically by an accounting software. This saves considerable resources in generating invoices, invoice processing and invoice delivery while providing even greater legal security.

**Media:**

The CFO of a media company verifies all tax-relevant processes with NGDX and essentially invests considerably less time and money for audits.

In general, there are almost no sectors where a legally secure document exchange would NOT provide a substantial benefit. To recapitulate, those are the prime benefits for customers:

- Swift collection of claims
- Reduced risk provisions for transactions
- Reduced costs for audits
- Observing compliance requirements
- Fast roll-out
- Facilitating the digitization of cross-company processes that naturally require a high level of confidence on both parties as well as total legal certainty

## **6. To Conclude: A Safe Document Exchange Simplifies Digital Transformation**

Next Generation Document Exchange (NGDX) allows businesses to store all information needed for exchanging critical documents in a transparent and traceable manner. When and where was what ordered? What arrangements were made for the date of payment and who confirmed these? Which contract draft is the latest edition and who signed it?

Content is being delivered without modification and its reception is always confirmed. No open questions remain.

You may even go one step further by allowing your NGDX system to calculate hash values from any information about transaction and actual content and deposit these hash values to a public Blockchain. Hash values are unmanipulable and verify each transaction, leaving no room for doubt. Thus, the blockchain-verified document exchange significantly simplifies future cooperation between companies and organizations and fuels digital transformation, particularly where a high level of legal security is mandatory. It is the first solution that provides a low-cost verification of content and delivery of digital documents. Straightforward like an E-Mail. Reliable like a certified mail with return receipt. Conclusive like a notary visit.



**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 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 well-rounded system. With this move, Ferrari electronic gains new opportunities while 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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info@ferrari-electronic.de  
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**ABOUT CRYPTOWERK**

Cryptowerk envisions a future in which all digital products, all processes and all transactions are trustworthy. To make this become reality, Cryptowerk develops solutions that digitally authenticate digital transactions, data and objects on a large scale. Former SAP executives, cryptography experts and experienced enterprise software experts founded Cryptowerk, which now has its headquarters at Silicon Valley and an office in Munich.

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Contact Cryptowerk at:  
info@cryptowerk.com or visit their website at www.cryptowerk.com  
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