

LogCoin



The Real World Crypto Asset for Logistics

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a **LedgerEngineers** brand

ABSTRACT

WITH THIS CONTRIBUTION, WE STATE THE BASIC FUNCTIONALITY OF LOGCOIN, **A BLOCKCHAIN PLATFORM FOR SHARING ECONOMY WITH A BALANCE SHEET REPORTABLE CRYPTOCURRENCY** FOR REAL BUSINESS PROCESSES WITHIN THE WORLD OF LOGISTICS AND SUPPLY CHAIN MANAGEMENT. THE KEY ELEMENT OF LOGCOIN IS THE COMBINATION OF **SMART CONTRACT APPLICATIONS** FOR DIFFERENT BUSINESS PROCESSES AND A CRYPTOCURRENCY TO REWARD LOGISTICAL SERVICES ALMOST IN REAL-TIME WITH NO ADDITIONAL FEES.

LOGCOIN PLATFORM IS DESIGNED TO IMPROVE THE EFFICIENCY OF LOGISTICS SERVICES IN BUSINESS-TO-BUSINESS (B2B) NETWORKS, TO CREATE **BUSINESS CASES IN THE PARCEL INDUSTRY** (BUSINESS-TO-CUSTOMER, B2C) BASED ON EFFICIENT CROWDSOURCING UND EMPOWER SHARED ECONOMY **APPROACHES FOR EVERYBODY** (COMMUNITY-TO-COMMUNITY, C2C).

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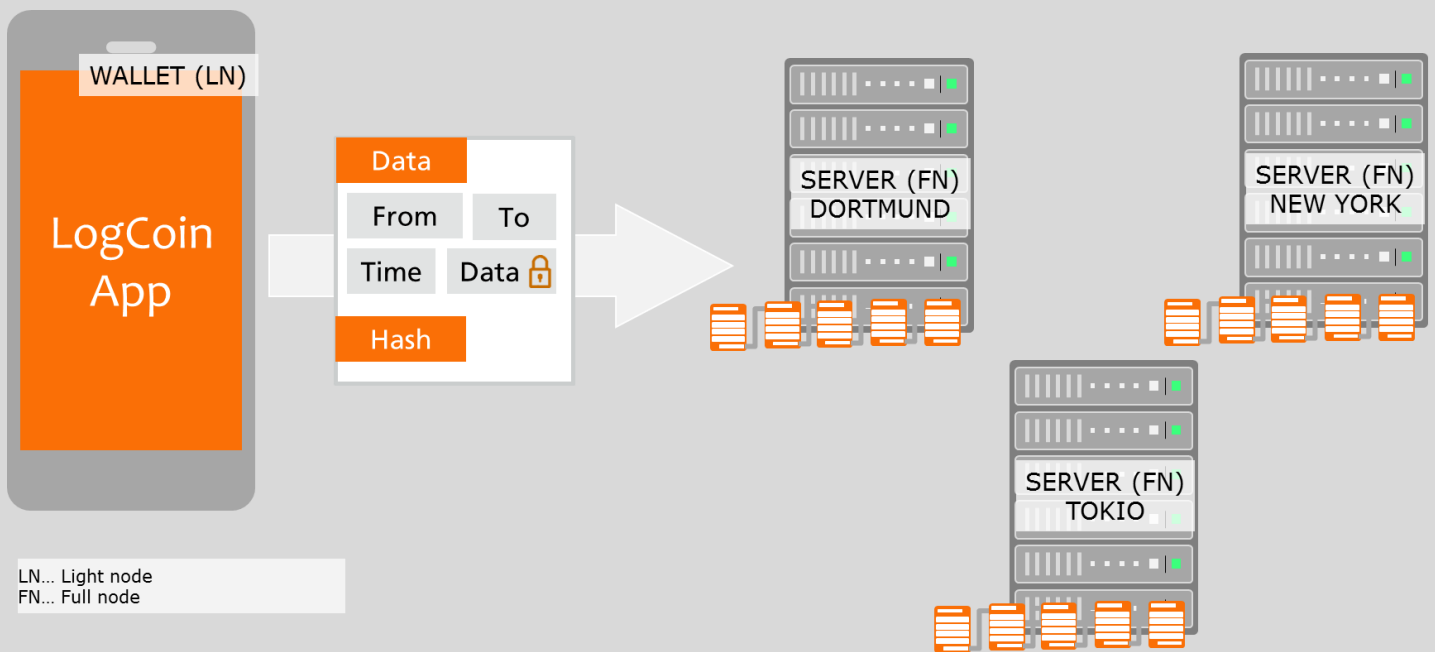
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1 INTRODUCTION

A BLOCKCHAIN TECHNOLOGY APPLICATION

SINCE THE ADVANTAGES OF BITCOIN AND OTHER CRYPTOCURRENCIES GOT VIRAL, THE POTENTIAL OF DIFFERENT INDUSTRIAL BLOCKCHAIN APPLICATIONS ARE PROMISING. WHILE THERE CERTAINLY IS GREAT POTENTIAL, TRANSFERRING THESE IDEAS INTO ACTUAL PRODUCTS IS A DIFFICULT AND TIME-CONSUMING TASK. EVEN BLOCKCHAIN TECHNOLOGY ITSELF HAS A NUMBER OF DRAWBACKS THAT NEED TO BE ADDRESSED.

DESPITE THAT, THE INTENT OF LOGCOIN IS NOTHING LESS THAN PIONEERING A BIG EVOLUTIONAL STEP TOWARDS DIGITAL TRANSFORMATION IN LOGISTICS AND SUPPLY CHAIN MANAGEMENT FUSED WITH BLOCKCHAIN TECHNOLOGY. WITH LOGCOIN WE PROVIDE A BLOCKCHAIN PLATFORM FOR CROWDSOURCED TRANSPORTATION SERVICES PROVISION (BPCTSP) FOR B2B, B2C AND C2C. LOGCOIN IS A PRIVATE NETWORK, WHICH COVERS DIFFERENT LOGISTICAL SHIPMENT APPLICATIONS, TRANSACTIONS MANAGEMENT AND IDENTITY MANAGEMENT.



One of the biggest advantages of LogCoin Pro is the efficient compliance and process control for courier, express and parcel (CEP) services providers without any additional equipment. After onboarding of CEP and the transfer of CEP's procedures and conditions on the LogCoin smart contract platform users can communicate directly with ERP.

LogCoins serve as a layer for easy world-wide transactions without being burdened by problems currencies usually face by having to comply with international standards.

Features:

- **NO ADDITIONAL HARDWARE REQUIRED**
- **TRACK & TRACE**
- **CONSIDERATION OF ENTERPRISE COMPLIANCE**
- **COMPLIANCE CONTROL VIA SMART CONTRACTS**
- **ALMOST REAL-TIME SETTLEMENT**

2.3 B2B – Digital Transformed Supply Chain Networks

Supply chain networks are the perfect en-

vironment for the application of blockchain technology. Many different parties have to put their trust in one another while they are transferring goods, assets and data. Thus, and the fact that supply chain partners cooperate and potentially compete at the same time requires trust and control. Especially in a more digitized and connected world where machines negotiate, a trustful platform is required.

With LogCoin we transfer the logic of your business processes into smart contracts - fully compliant. The automation potential of smart contracts in B2B environments is huge. This automation of processes increase speed and efficiency along supply chains, cutting costs and maximizing profit.

Together with track & trace systems we can support different services for the Industry 4.0:

- **MICRO-PAYMENTS BETWEEN MACHINES**
- **SMART CONTRACT PROTECTED PAY PER USE SERVICES**
- **SLA-DRIVEN SMART CONTRACTS**



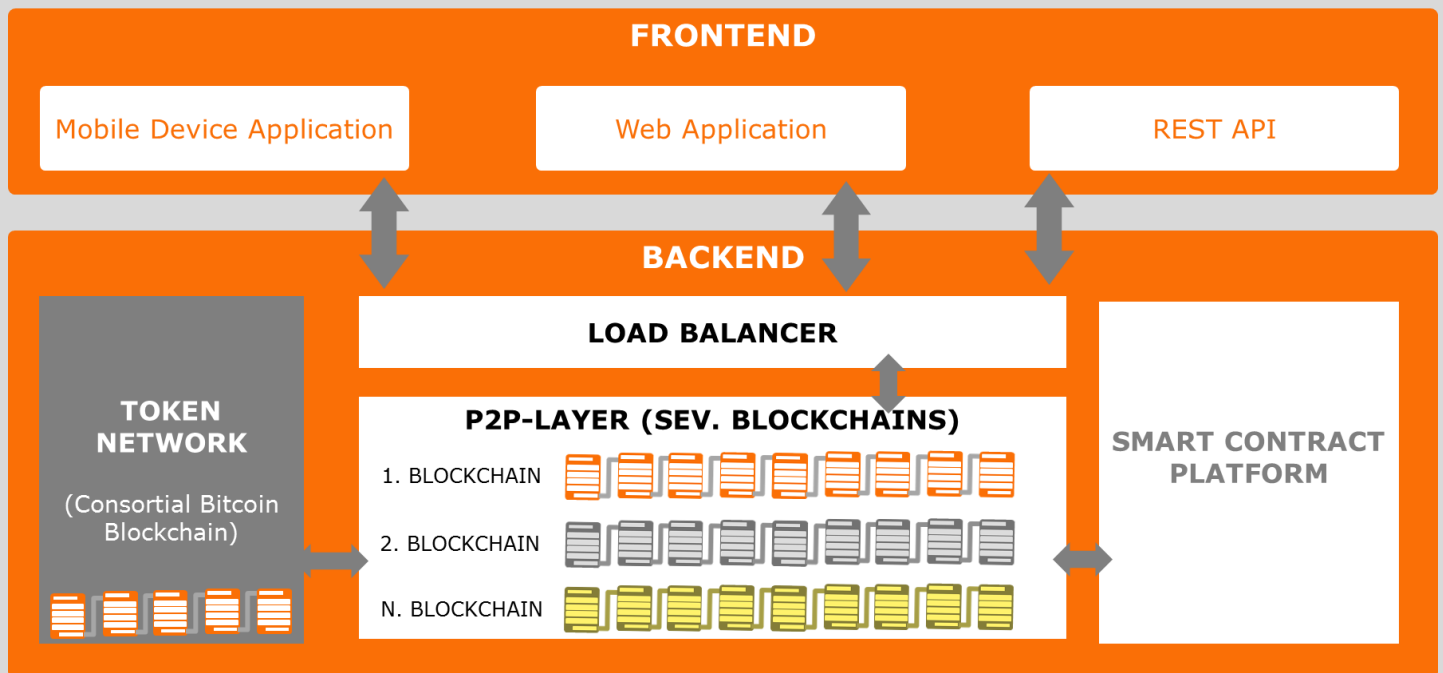
2 ARCHITECTURE

BEHIND THE SCENES

SEVERAL DISTRIBUTED LEDGER TECHNOLOGY (DLT) PROJECTS ARE DEVELOPED ON A SPECIFIC SOLUTION SUCH AS THE HYPERLEDGER FABRIC, THE ETHEREUM NETWORK OR IOTA. WHILE THEY OFFER AMAZING FEATURES, DEPENDING ON HOW YOU APPROACH YOUR OWN PROBLEM, IT CAN PROVE DIFFICULT TO MAKE ONE OF THEM WORK FOR YOU IN A PRIVATE ENVIRONMENT. ESPECIALLY SO SINCE SOME RELY HEAVILY ON GIVEN INFRASTRUCTURE.

IN ORDER NOT TO TIE OURSELVES DOWN TO A SINGLE SOLUTION WE MAKE USE OF VARIOUS ENCAPSULATED BLOCKCHAIN (SPECIAL FORM OF DLT) CONCEPTS AND EVEN COMBINE THEM IF NECESSARY.

WE HAVE KNOWLEDGE ON HOW TO EXTRACT THE BEST FEATURES OUT OF DIFFERENT BLOCKCHAIN CONCEPTS. FOR LOGCOIN WE BUILT OUR SOLUTION ON THE BASIS OF THE BITCOIN (FIRST BLOCKCHAIN APPLICATION EVER) PROTOCOL WITH NUMEROUS IMPROVEMENTS.



2.1 Consortial Blockchain Networks

The LogCoin network consists of several different enclosed blockchain instances. The central element of LogCoin is the token network. This consortial blockchain network provides the heart of our application: The pre-allocated (coins are already mined, such as Ripple) asset "LogCoin" (see token network).

Alongside the token network, the smart contract platform guides the logistical processes of parcel delivery. This platform requires a huge amount of data about process execution to ensure autonomous monitoring of a smart contract.

For user interaction, three different interfaces have been implemented. One of them being a mobile application for monitoring physical parcel delivery processes. This application is used to place orders or claim them, to execute transactions, as a GPS-location tracker and as an inbound oracle for the validation anchors (see validation anchors).

Furthermore, especially for business use, a web application is provided to manage user accounts. The web application enables

the editing of personal information, getting a better overview of account activities and managing of smart contracts.

The third possible interface consists of different REST-Services for a direct communication with the backend. With aid of these services, other applications like ERP-software can be plugged to the system.

The communication between frontend and backend is predominant implemented over REST-services. To join the LogCoin platform an account at the coin network is required to become a light node. Nevertheless the tracking information and contracting data are transmitted over the REST-API, only Light Nodes are permitted to communicate. To ensure the authenticity of the communication partner, the Light Node signature is used to sign the messages.

2.2 Cross-Scaling

One of the biggest challenges in real world usage of DLT today is scalability. The transactions per second performed by a blockchain are limited. This is due to a usually very time and resource intensive consensus mechanism.

```

ALGORITHM create smart contract
  request Light Node balance from the coin network
  IF Validation of the Light Node signature at the coin network successful
  AND Light Node balance  $\geq$  Contract costs
  THEN
    Blockchain instance  $\leftarrow$  Choose an instance from the hash table based on the contract id
    Hash value for contract entries  $\leftarrow$  Create random hash value
    create new block in chosen blockchain instance with contract information and hash value
    RETURN blockchain instance id AND created random hash value
  END
END

ALGORITHM receive mobile device data
  IF Validation of the Light Node signature at the coin network successful
  THEN
    Blockchain instance  $\leftarrow$  Get the correct blockchain based on the submitted blockchain instance id
    IF Contract entry with submitted hash value exists
    create new block with submitted data and hash value
  END
END

```

This problem is known and made a subject of discussion in relevant literature and many communities. But that's only if you consider one single blockchain.

Therefore, we began to consider running multiple blockchains in parallel. Similar to micro services, the balancer starts new instances of the blockchain to handle the increased incoming data traffic. The balancer can be seen in the figure on page eight, but is and will not explained in detail in this paper.

Once started, it is not possible to stop them if the traffic decreases. Our first tests revealed that this is no problem at all. Since from a performance perspective, it is easily possible to run many hundred blockchain instances in parallel. To get rid of a blockchain instance, it is necessary to wait until all contracts stored in it are finished.

2.3 Smart Contracts

The LogCoin platform uses smart contracts to handle different delivery processes autonomously. Therefore, a generic process

sequence is defined to fit most of the requirements. Specifically for business users we offer a plug-in library to provide a wider range of smart contracts.

**A SMART
CONTRACT
CONSISTS OF
„CLASSIC“ IF
THEN ELSE
CONDITIONS.**

The standard workflow of the parcel delivery is recorded by using the smartphones of LogCoin users as cyber-physical systems (CPS).

Starting with the pickup at the senders place until the hand over to the recipient.

Every data object provided by the smartphone is stored in the P2P-Layer for further evaluation. The evaluation of the smart contract starts with the hand over to the recipient.

All data collected so far will be validated and checked for consistency. After a successful delivery, the coin transfer is autonomously triggered by the smart contract.

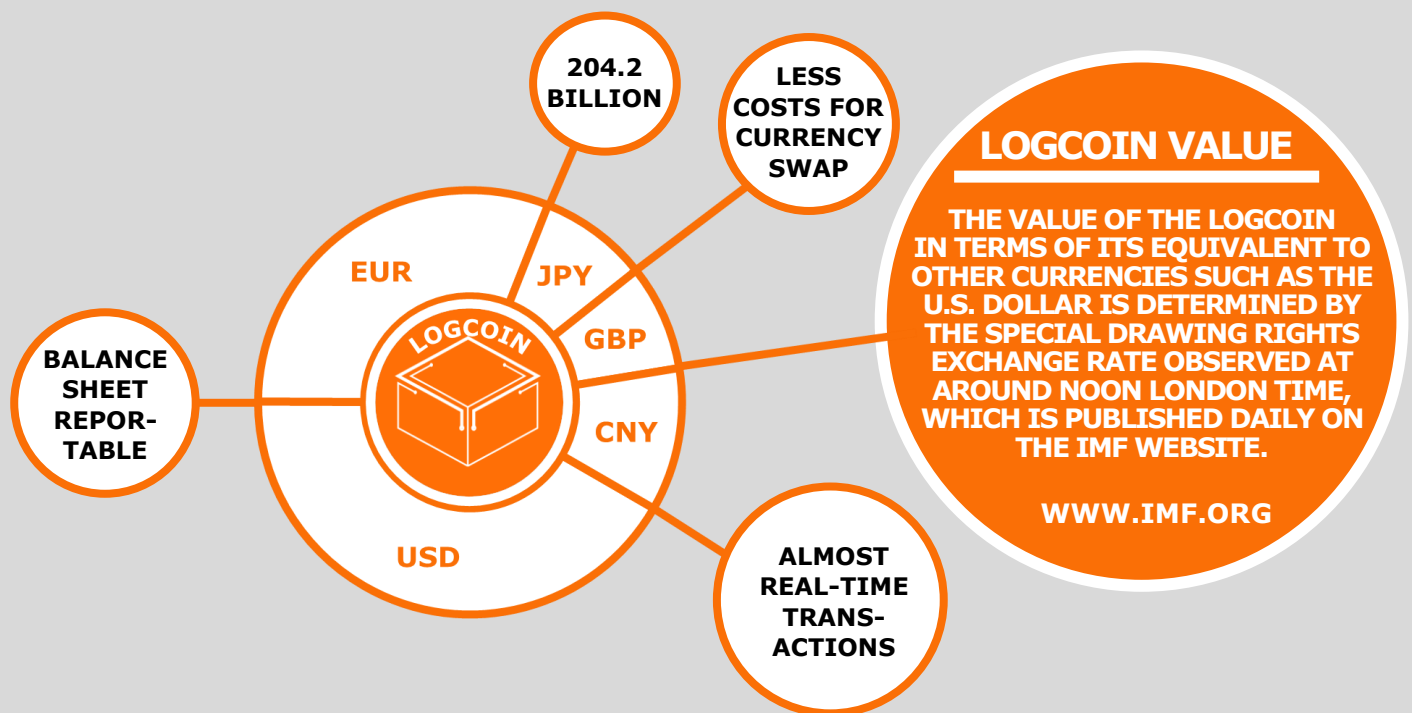


#3 SMART PAYMENT

LOGCOINS AS REPORTABLE ASSET

TODAY THERE ARE SEVERAL THOUSAND DIFFERENT CRYPTOCURRENCIES ON THE MARKET. THEY ARE USED AS FUNDING INSTRUMENTS, HIGH RISK INVESTMENTS AND EVEN AS INTERNATIONALLY RECOGNIZED CURRENCIES. AS A MATTER OF FACT, SO FAR NONE EXIST THAT ARE REPORTABLE ON BALANCE SHEETS.

FOR AN INTEGRATION OF CRYPTO-TOKENS IN A SERIOUS BUSINESS ENVIRONMENT A REGULATORY FRAMEWORK IS REQUIRED. THE LOGCOIN TOKEN WORKS AS A STABLECOIN REPRESENTING SPECIAL DRAWING RIGHTS. USING THAT SUPPLEMENTARY INTERNATIONAL RESERVE ASSET OF THE IMF, ENABLES LOW RISK TRANSACTIONS IN AN INTERNATIONAL ENVIRONMENT.



3.1 Token Network

LogCoin is built on the protocol of the digital currency Bitcoin (for further information see Nakamoto 2008). However, there are significant functional differences in this network. LogCoin describes an asset centric technology such as Ripple or IOTA (see Tasca et. al. 2017 p. 10 for further details). For instance, LogCoin works completely without mining processes. There is no time-consuming and complicated proof mechanism required, because all participants have a special interest in maintaining the integrity of the network. At the same time, mining risk such as competition and price drops are avoided (see Hileman and Rauchs 2017, pp. 101).

All LogCoins are pre-allocated. The total amount of LogCoin is about 204.2 billion. This corresponds to the current volume of Special Drawing Rights. These tokens are irreversible set in the "GALAXY Protocol", which is required to start the network. The administration rights are shared in the consortium. After the start of the network, it is not possible to issue any additional tokens. After the launch, the Galaxy protocol permits only transactions within the network.

Transaction request will be send from light nodes via round robin procedure to full nodes.

3.2 Special Drawing Rights (SDR)

LogCoin is a SDR-crypto-token. The classic SDR is an international reserve asset, which was created in 1969 (see IMF, 2018). The value of the SDR is based on the five most important currencies for trade and logistics (USD, EUR, CNY, JPY and GBP). Especially for international liability matters SDR are used in logistics.

One of the key features of the LogCoin token is the report ability in balances sheets. We use a simple trick here. LogCoin, works like a crypto-currency, but is per definition a financial product. As matter of fact, LogCoins can be disclosed in one of these five different currencies.

If you once buy in, you are able to do as many transaction as you wish, with no additional fees. We aim to set the buy in fee as low as possible, so that it is less expensive than a "classic" currency trade.

4 INTEGRITY

SECURITY AND TRUST

INTEGRITY IS MORE THAN A TECHNICAL DETAIL WITHIN LOGCOIN. IT RAHTER STANDS FOR OUR DEVELOPMENT MAXIME. IN ADDITION TO ARCHITECTURAL DETAILS, SUCH AS THE DEVELOPMENT OF FUNCTIONS AND SERVICES IN ENCAPSULATED BLOCKCHAIN-ISLES WE INTEGRATE PROCEDURES AND ALGORITHMS, WHICH ENSURE SECURITY AND SUPPORT TRUST.

TO PREVENT FRAUD IN THE LOGCOIN NETWORK WE HAVE DESIGNED UNBREAKABLE IDENTITY MANAGEMENT PROCEDURES. NEXT TO IDENTITY MANAGEMENT WE USE TRACKING EVENTS TO GUARANTEE OUR SMART CONTRACTING. THESE VALIDATION ANCHORS WILL NEITHER BE FORWARDED NOR BE PROCESSED. SO WE CAN PROVIDE A TRUSTFUL PLATFORM AND CONFIDENTIALITY AT THE SAME TIME.



4.1 Identity Management

Within the LogCoin world, a valid digital identity of every user and organization is required to avoid fraud and illegal businesses. While downloading the LogCoin app we do a first community check of the user's identity and check rudimentary information. These information contain data about the used mobile device and the digital distribution platform.

Google's Play Store or Apple's App Store will provide us the minimum of identity information such as email address, country location and other to let the new user enter the LogCoin world. In a next step LogCoin users are able to set up their accounts and create personal LogCoin profiles with identity information such as photo, age etc. For active usage of the LogCoin platform, e.g. publishing service requests, the so called contracts, users need to cash in some LogCoins.

LogCoin will support all common payment procedures such as amazon pay, apple pay, paypal, SEPA, credit card and LogCoin vouchers. At this point, every user has the opportunity to do an identity check to get full member rights on the LogCoin platform. For executing contracts and claiming services, every user identity needs to be confirmed. Users can do that with other valid accounts such as bank accounts, amazon pay account or personal ID in combination with a two factor authentication

routine. To make the identity of every user more trustworthy, for every fulfillment of a contract a mandatory rating of their service will be asked of the contractee. So that nobody causes damages or anomalies with stolen identities. The LogCoin app features a second layer of security in form of a pass code, which a user has to input before accessing their wallet. So a lost phone doesn't immediately mean you've lost your wallet.

4.2 Validation Anchors

The validation anchors in LogCoin are closely related to the identity management features. For the integrity of the LogCoin platform several different validation anchors check the smart contractual consensus. **A validation anchor describes a routine, which proves how user actions fit to the contractual agreement.**

Characteristic anchors:

- **GPS-DATA**
- **TIME-STAMPS**
- **QR-CODE**
- **PICTURES**
- **OPEN DATA**

The mobile device supplies event, profile and action related data such as time, speed, location etc. This data is compared with system rules and agreements in the contract, but are not saved.

5 MISSION

LET'S START A JOURNEY TOGETHER

THE IDEA BEHIND LOGCOIN IS A **PLATFORM FOR DIGITIZED LOGISTICAL SERVICES ALONG GLOBAL VALUE CHAINS**. LOGCOIN IS DESIGNED TO PROVIDE THE BACKBONE FOR TRUSTFUL TRANSACTIONS OF PHYSICAL GOODS AND FINANCIAL ASSETS.

ON ONE HAND **WE WANT TO CREATE MONETARY INCENTIVES IN SHARING ECONOMY AND REWARD COMMUNITY EFFORT.**

ON THE OTHER HAND, WE SEE A HUGE POTENTIAL OF IMPROVEMENT WHEN IT COMES TO FINANCIAL FLOWS AND SECURE PROCESS AUTOMATIZATION BASED ON SMART CONTRACTS IN SUPPLY CHAINS.

AND EVEN IF WE, THE COMPANY BEHIND THE LOGCOIN, CEASE TO EXIST AT ONE POINT IN TIME. THE LOGCOIN IS DESIGNED TO STILL LIVE ON WITHOUT OUR GUIDANCE AKIN TO THE LIKES OF BITCOIN. LEDGER ENGINEERS MERELY PROVIDES A PLATFORM FOR IT TO BE USED, BUT BY ITS **NATURE LOGCOIN IS A SELF-PRESERVING CURRENCY THAT IS NOT TIED TO THE LIVE EXPECTANCY OF ONE SINGLE COMPANY.**

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API	Application Programming Interface
B2B	Business-to-Business
B2C	Business-to-Customer
BPCTSP	Blockchain Platform for Crowdsourced Transportation Services Provision
C2C	community-to-Community
CEP	Courier, Express and Parcel
CNY	Chinese Yuan
CPS	Cyber-physical System
DLT	Distributed Ledger Technology
ERP	Enterprise-Resource-Planning
EUR	Euro
GBP	Pound Sterling
GPS	Global Positioning System
ID	Identification
IMF	International Monetary Fund
JPY	Yen (Japan)
P2P	Peer-to-Peer
QR-Code	Quick Response Code
REST	Representational State Transfer
SDR	Special Drawing Rights
SEPA	Single Euro Payments Area
SLA	Service Level Agreement
USD	US-Dollar

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Emil-Figge-Straße 76
44227 Dortmund, Germany

Get in touch with us:

info@ledger-engineers.com
www.ledger-engineers.com/logcoin



Authors:

Dr. Philipp Sprenger

LedgerEngineers (Founder)
&
Fraunhofer Institute for
Material Flow and Logistics

Dominik Sparer

LedgerEngineers (Founder)
&
Fraunhofer Institute for
Material Flow and Logistics

Christofer Heyer

LedgerEngineers
&
Fraunhofer Institute for
Material Flow and Logistics

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