Block Labs publications
Type: Project White Paper
Status: Published
Updated: 20.01.2021
Europe 2017 - 2022
https://4thtech.io/

4THPILLAR TECHNOLOGIES (i.e., 4thTech)
Project White Paper

Executive Summary; The internet changed the way we live, it opened the ways of unlimited communication and revolutionized access to information, but it failed greatly regarding our digital freedom. Instead of providing trust, granted privacy, security, peer-to-peer communication, simplification, and digital money, it evolved into a system of global intermediaries, that manipulate our private data and charge a percentage for every interaction. There is a new technology at the horizon called blockchain, which in its core excludes any intermediary's, it brings peer-to-peer communication, online trust, security, privacy, authenticity, identity, synchronizes ledger and much more. 4thpillar Technologies or short 4thTech is the next-gen multi-blockchain habitat, platform, cryptocurrency, and a suite of de-apps that enable users to exchange metadata, data files and on-chain short messages from wallet to wallet in a secure and decentralized manner. 4thTech initiative strives to enable a self-sovereign framework of data authorization and ownership representation and leverages the power of blockchain to facilitate data source and time confirmation. The protocols in its core prevent ads, tracking and data mining! This whitepaper was written as a hybrid addressing the *4thpillar Technologies* product benefits and solutions.

Dr. Tali Režun, head of *4thTech* R&D

Keywords: 4thpillar, 4thtech, FOURdx, FOURid, FOURns, FOURim, FOUR, digital transformation, blockchain technology, decentralization, peer-to-peer, online trust, online security, online privacy, DLT

1. INTRODUCTION

Privately exchanging sensitive digital data files and documents should be as easy as exchanging information. Blockchain technology proposes the ideal foundation to simplify digital value-holding data file and documents exchange. To address this issue in 2017, 4thpillar Technologies *(i.e., 4thTech),* proposed and later developed a safe, fast multi blockchain-based solution, which leverages encryption and trust provided by the blockchain to enable secure, immutable digital data file and meta data exchange or short FOURdx. To provide blockchain digital identity and public key exchange between users, the FOURid was later constructed in 2018, which can authenticate verified connections between a blockchain wallet and a person. Data source verification or FOURns is also an essential part of the *4thTech* ecosystem and provides unique data timestamp and file checksum authenticity verification.

4thTech solutions are reducing the usage of paper and actively help the environment. The applications of *4thTech* services are limitless, as they could be applied to any industry. The article from The Economist ("The Second Half of the Internet," 2019) predicts that billion new internet users will be joining the rest of us soon, there are countries such as Mauritius that are skipping centralized digitalization and want to adopt blockchain technology directly. According to (*Time For Trust: How Blockchain Will Transform Business and the Economy - PwC*, n.d.), blockchain has the potential to boost global domestic product (i.e. GDP) by 1.76 trillion dollars over the next decade and hit the mainstream by 2030. PwC report also points out that some 60% of CEOs are placing digital transformations among their top three priorities and that organisations have recognised the value of online trust and cybersecurity between their business partners and customers.

1.1. VALIDATION

After two years of *4thTech MVP* (i.e., minimum viable product) early adopter testing and refinement according to European standards, the technical feasibility and its practical potential

have been proven, with that PoC (i.e., proof of concept) was confirmed. Moving to version 2.0, *4thTech* enters the adoption phase and becomes globally interoperable and ready to use.

In May 2018 Adriatic council awarded Dr. Tali Rezun with the Beyond 4.0 award for his dedication, promotion and accomplishment in the field of science, new technologies and innovation for the 4THPILLAR Blockchain platform. (*Adriatic Council | BEYOND 4.0 – LJUBLJANA, 25.05.2018. KRISTALNA PALAČA (BTC)*, n.d.)

2. BLOCKCHAIN TECHNOLOGY

According to *Economic Commission for Europe Executive Committee Centre for Trade Facilitation and Electronic Business Blockchain in Trade Facilitation: Sectoral challenges and examples*, 2019, electronic commerce often involves transactions between parties where there is a need to establish reliability in the exchange and transparency. The Economic Commission for Europe, also points out, that Blockchain, as a type of distributed ledger, ensures tamper-proof digital transactions through the use of cryptographic technology and automated consensus. Blockchain provides a decentralized and secure shared digital ledger, which gives participating parties a way of validating information related to a transaction. In doing so, it speeds up the process and cuts out intermediaries and costs. Blockchain is made from a trail of validated facts. These facts can be anything from money to information. As part of this digital system of record-keeping, each transaction and its details are validated and then recorded across a network of computers. Everyone who has access to the distributed ledger receives this information and the parties agree on the accuracy before the block is replicated, shared and synchronized among the entities. A Blockchain is virtually impossible to tamper with since each block of information references the block before it. In an age when trust is both elusive and held at a high premium, Blockchain presents a way to confirm, validate and authenticate both values and events. Smart contracts are codes or rules written into a digital program, which determines what happens when digital assets come in or when certain conditions are met. Blockchain technology is one of the most promising developments in the information technology (i.e., IT) domain. According to (*Blockchain Technology Market Size, Share | Industry Report, 2019-2025*, n.d.), the global blockchain technology market size was valued at 1,590.9 million in 2018 and is expected to grow at a CAGR of 69.4% from 2019 to 2025.

3. eDELIVERY

According to the Connecting Europe Facility (CEF), eDelivery is a network of nodes for digital communications. It is based on a distributed model where every participant becomes a node using standard transport protocols and security policies. eDelivery helps public administrations to exchange electronic data and documents with other public administrations, businesses, and citizens, in an interoperable, secure, reliable and trusted way. It is one of the building blocks of the Connecting Europe Facility (CEF). These building blocks are reusable specifications, software, and services that will form part of a wide variety of IT systems in different policy domains of the EU.

3.1. BLOCKCHAIN eDELIVERY

Blockchain eDelivery can be described as a network of nodes for digital communications and digital data file and document exchange. According to our theory, it is based on a decentralised model where the digital data and document exchange process runs between blockchain wallets. Private and public cryptographic keys are used for transaction authentication. Due to decentralization, blockchain eDelivery has significant security advantages, compared to traditional eDelivery.

3.2. BLOCKCHAIN DIGITAL IDENTITY

According to (*Blockchain-for-Digital-Identity*, n.d.) blockchain has facilitated the so-called self-sovereign identity, which is inherently unalterable and more secure than traditional identity systems, which has the potential to completely change the way we use identities to connect to different online services. Individuals or organizations can now leverage the *4thTech* digital identity solution to map their blockchain wallets with their established online digital identities, enabling the use of blockchain technology in regulated sectors and industries.

3.3. BLOCKCHAIN DATA NOTARISATION

Blockchain data notarisation can be described as a fraud prevention process that enables data files or document authenticity and guarantees that the data has not been changed in the course of a

transaction between blockchain wallets. Usually, the physical notary acts as an intermediary and provides the needed trust factor between parties, but in the case of *4thTech*, the system sources the needed trust directly from the blockchain. *4thTech* notarisation service can be also described as a digital notary of the decentralized world as it provides sensitive data file timestamp and origin verification. During exchange from wallet A to wallet B, the data file hash is stored on the blockchain. In the case of future disputes over the data file authenticity, the user can match the data exchange transaction hash stored on the blockchain ledger.

4. THE STORY BEHIND THE *4THTECH* BRAND

According to many, there are three fundamental technology developments in human history; (1) the invention of electricity; (2) the invention of the microprocessor, and; (3) the invention of the internet. We are certain, that the invention of blockchain technology is the fourth fundamental technology pillar, which revolutionary applications will yet to be revealed to the world.

4.1. THE CHARTER

4thpillar Technologies or short 4thTech is the next-gen multi-blockchain habitat, platform, cryptocurrency, and a suite of decentralized applications that enable users to exchange metadata, data files and on-chain short messages from wallet to wallet in a secure and decentralized manner.

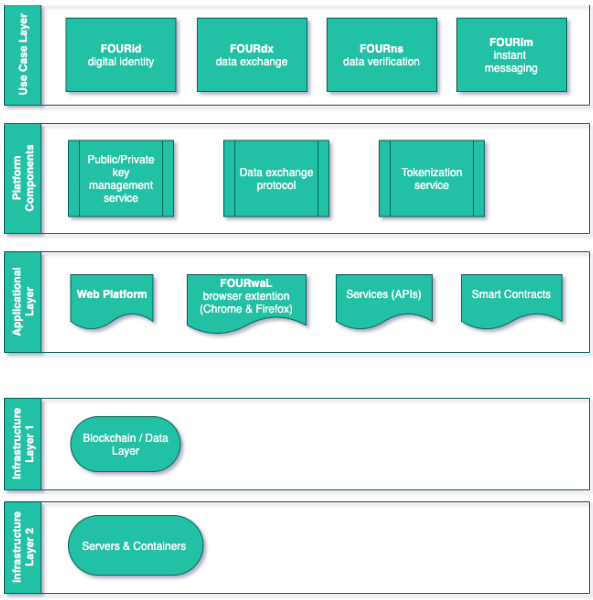
With a charter to establish a foundation for; (1) decentralized digital identity; (2) multi-chain data exchange; (3) digital data notarisation, and; (4) decentralization of cloud storage, the 4thTech initiative strives to enable a self-sovereign framework of data authorization and ownership representation and leverages the power of blockchain to facilitate data source and time confirmation.

4.2. AIM & OBJECTIVE

The aim and project objective is to enable; (1) a secure affordable encrypted data file exchange and on-chain short messaging solution with no ads, no data mining and no tracking; (2) wider adoption of blockchain technology, and; (3) to pioneer the future of encrypted decentralized data exchange.

5. DISCOVER 4THTECH VIA LAYER INFRASTRUCTURE

(1) use cases layer defines all the project solutions (i.e. FOURid, FOURdx, FOURns, FOURim); (2) the second layer defines the platform components (i.e. public/private key management service, data exchange protocol and tokenization service; (3) the third layer defines the applications (i.e. web platform, browser extension wallet, API services and smart contracts), and; (4) infrastructural layers are defining capabilities and connectivity's to blockchain networks and hardware and scalability tools.



6. DIGITAL IDENTITY PROTOCOL *(i.e., FOURid)*

There is a constant need for online identity verification, and despite the move towards digital transactions, there is still the need to use physical identity documents. According to Economic Commission for Europe Executive Committee Centre for Trade Facilitation and Electronic Business Blockchain in Trade Facilitation: Sectoral challenges and examples, 2019, blockchain holds promise in this regard and could be used to create and verify digital identities, for individuals and organizations. Trusted identities of blockchain participants are crucial to any operational success and can enable complex transactions and reduce risk. The verified identity of any partner in the business process or a network builds a core foundation for any business or blockchain endeavour. *4thTech* digital identity protocol is embedded into the solution design and enables wallet address verification of an individual or an organisation. *4thTech* digital identity mechanism

(i.e., FOURid) leverage digital identity standard such as X.509 to establish a viable usable solution.

6.1. *FOURid* SOLUTION

4thTech's identity protocol FOURid connects entities, organizations, and individuals in a decentralized internet. FOURid connects wallets when data is exchanged and serves as the public key exchange point between users (i.e., sender needs a public key of the receiver). With its native design, the FOURid identified data and its owner. It can be used also to assign digital cryptography-based identity certificates, such as X.509 to different entities such as individuals or organizations. To clarify further, the FOURid provides wallet address verification of an individual or an organisation by creating a link between an X.509 user's online identity and blockchain wallet address.

**__Note:__ The FOURid framework is compatible with all the Ethereum based addresses, additionally it supports HashNet, Polkadot Substrates & Solana.*

FOURid enables a self-sovereign framework of data (i.e., data files and metadata) authorisation and ownership representation. All ID processes are fully automated and decentralized by their design, thereby enabling users to full control and ownership of any data that may be connected with them. Attached with a specific blockchain wallet address the data can now be verified, while the X.509 digital certificate standard provides the off-chain connection with individuals and organizations.

6.2. DIGITAL CERTIFICATE X.509 STANDARD

Digital certificate standard X.509 Public Key Infrastructure can be used for data encryption, notarization of signed data, digital signature, digital identity verification and timestamp. With various European Union certificate publications, the X.509 standard is widely used and as such appropriate for blockchain digital identity integration. The X509 Public Key Infrastructure is also approved by eIDAS (i.e., electronic IDentification, Authentication and Trust Services).

6.3. X.509 CONNECTION PROCESS;

(1) the user selects the X.509 standard qualified digital certificate, associated with individual or organisation; (2) simple KYC form is completed with certificate holder name, last name and tax number; (3) FOURid mechanism prepares and sends WSDL request in a SOAP envelope via HTTP POST protocol to the government managed automated service (i.e., the issuer of the X.509 certificate), which replies with the verification. If the user's tax number corresponds with the qualified digital certificate serial number, the user is successfully verified; (4) A link is created by the FOURid between the user's X.509 digital certificate and its 4thTech wallet address.

**__More__ FOURid related information: https://wiki.the4thpillar.com/intro/discover.html#fourid-4thtech-digital-identity-protocol*

7. DATA EXCHANGE PROTOCOL *(i.e., FOURdx)*

The need for immutable, unmodifiable digital data file exchange is imminent. E-mail is not appropriate, non-secure and does not fulfil the task in question. Digital content can be created, edited, manipulated and exchanged very easily, which causes trust issues and slows down digital transformation, as organisations must still rely on intermediaries such as notaries. 4thTech is solving this challenge with its wallet to wallet data file exchange communication protocol or FOURdx.

7.1. CURRENT CEF SOLUTION

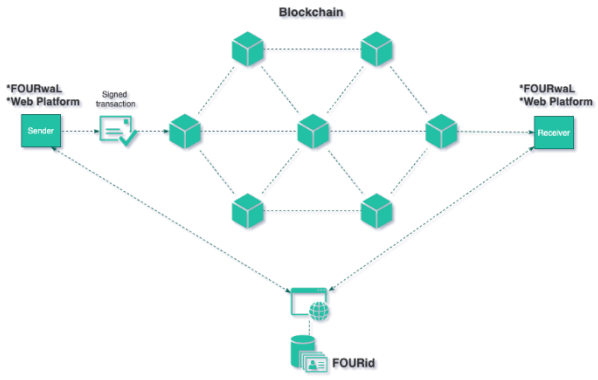
The current CEF electronic data and document exchange and eDelivery, is based on a model, where the Access Points of eDelivery implement an electronic data and documents exchange protocol, which ensures secure and reliable data exchange. Trust is established between two public administrations' Access Points and the electronic data and documents exchange is activated.

7.2. FOURdx SOLUTION

FOURdx is a decentralized data file and metadata exchange communication framework built on public blockchains, enabling organizations and individuals to collaborate and exchange data in a secure and decentralised manner.

FOURdx leverages trust sourced from the blockchain and provides a secure, immutable wallet A to wallet B (i.e., FOURwaL) data exchange. The protocol is capable of; (1) connecting senders and receivers using the FOURid mechanism; (2) exchanging metadata and data files; (3)

performing eDelivery based on the current EU guidelines; (4) archiving securely encrypted digital data files, and (5) following the GDPR guidelines.



Defined as a decentralized network framework, FOURdx supports any data file exchange between wallet addresses of supported blockchains (i.e. Ethereum, HashNet, Polkadot Edgeware, and Solana). Supported by a modern intuitive web platform and thanks to multi-chain support, the FOURdx is accessible and affordable to all users.

**Note:* *The FOURdx protocol is compatible with all the Ethereum based networks, additionally it supports HashNet, Polkadot Substrates & Solana.*

7.3. GDPR COMPLIANT APPLICATION

As a result of extensive three years of legal and procedural GDPR research, the FOURdx can be recognised as a GDPR compliant application as no personal data is stored on-chain but resides off-chain. FOURdx records links to encrypted files and hashes of the encrypted content on the blockchain.

7.4. SIMPLIFYING THE *4THTECH* DATA EXCHANGE PROCESS;

(1) data upload to the *4thTech API*; (2) data storage to the off-chain repository (i.e., decentralized repository options will be available in the future); (3) sending the link to encrypted files and hashes of the encrypted content through the blockchain to a recipient-specific wallet address, and; (4) download and decryption of the received data (decryption is done with the user's private key saved in the *4thTech* blockchain wallet system).

**More FOURdx related information:*
https://wiki.the4thpillar.com/intro/discover.html#fourdx-data-exchange-protocol

**Quote;* *"I see amazing possibilities in 4THPILLAR TECHNOLOGIES products. The FOURdx, electronic data and documents exchange serves as a system for sensitive document distribution between organizations and individuals and is based on blockchain technology. A truly innovative and amazing solution."*

Igor Zorko, ZZi

8. DATA SOURCE AND TIME STAMP VERIFICATION SERVICE *(i.e., FOURns)*

Notarisation can be described as a fraud prevention process that enables data file (e.g., document) authenticity and guarantees that the data file has not been changed in the course of a transaction between parties. Usually, the physical notary acts as an intermediary and provides the needed trust factor between parties. 4thTech notarisation service can be also described as a digital notary of the decentralized world and with its main solution enables sensitive data files time-stamp and origin verification using blockchain as a "trust" source.

8.1. FOURns SOLUTION

As a by-product of data exchange protocol (i.e., FOURdx), the FOURns can leverage the power of blockchain to facilitate source and time confirmation for any data files exchanged within the 4thTech ecosystem.

8.2. SERVICE CAPABILITIES

(1) storing and timestamping digital data files; (2) providing the file checksum verification of the digital data authenticity, and; (3) providing access and review of the received data file details.

8.3. DATA VERIFICATION PROCESS SIMPLIFIED;

(1) user account created within the *4thTech* wallet (i.e., FOURwaL); (2) user account verification using *4thTech* digital identity (i.e., FOURid) within the *4thTech* web platform (option); (3) blockchain notarisation checksum and timestamp verification of the received data file, using *4thTech* unique notarisation function (i.e., FOURns) within the *4thTech* web platform.

**More FOURns related information:*
https://wiki.the4thpillar.com/intro/discover.html#fo

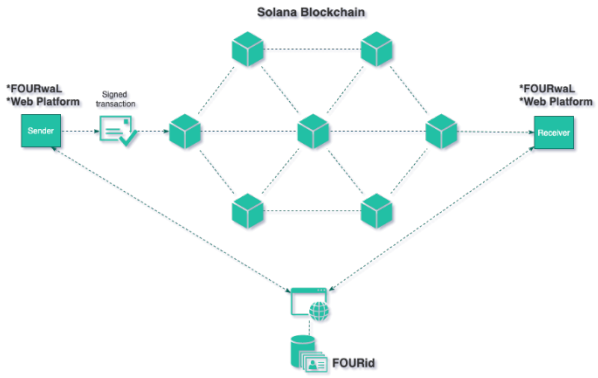
urns-4thtech-data-source-and-time-stamp-verification-service

9. SHORT ON-CHAIN MESSAGING PROTOCOL

Privacy in online communication is a fundamental right of every person. Exchanging private instant messages securely over the internet should be easy and accessible to all. Blockchain technology proposes the ideal foundation to enable this solution. Up to now, on-chain instant messaging deployment would be hard to achieve due to slow blockchain network speed, congestion and transaction cost. With the arrival of the Solana blockchain on-chain, instant messaging is becoming a reality. To address this issue the 4thpillar Technologies (i.e., 4thTech), developed a safe, fast Solana-based solution, which leverages blockchain trust and provides secure, immutable, instant wallet to wallet messaging protocol.

9.1. FOURim SOLUTION

The FOURim protocol leverages the Solana blockchain to serve as an immutable ledger exchanging encrypted messages from FOURwaL wallet SOL address A to FOURwaL wallet SOL address B. (*4THPILLAR TECHNOLOGIES Layer 1 Blockchain Instant Messaging (i.e. FOURim) Light Paper*, n.d.)



The FOURim protocol connects to the Solana blockchain node using JSON-RPC protocol. The 4thTech digital identity (i.e., FOURid) connects both the wallet of the message sender and the wallet of the message receiver and serves as the public key exchange point between both users (sender needs a public key of the receiver). To achieve the security of decentralization, the messages are not stored on a company centralised servers but are temporarily stored on the Solana blockchain itself and deleted after 7 days. Smart contracts are used to facilitate two unique requirements; (1) saving instant messages from the sender, and; (2) retrieving instant messages from receivers.

9.2. ENCRYPTION

FOURim utilizes RSA encryption to secure immutable blockchain instant message exchange. The messages are encrypted with the asymmetric algorithm (i.e., RSA), which is used to encrypt the instant message with the public key of the receiver. This design does not allow an attacker to infer relationships between segments of the encrypted message.

9.3. SMART CONTRACTS

Smart contracts are used to facilitate two unique requirements; (1) saving instant messages from the sender; (2) retrieving instant messages from receivers.

9.4. INSTANT MESSAGING PROCESS SIMPLIFIED;

(1) encryption of instant message; (2) the execution of blockchain transactions, via smart contract.

**More* *FOURim related information:*
https://wiki.the4thpillar.com/intro/discover.html#fourim-4thtech-instant-messaging-protocol

10. MULTI-CHAIN CLIENT APP WALLET *(i.e., FOURwaL)*

According to (*Cryptocurrency Wallet - Wikipedia*, n.d.), a cryptocurrency wallet is a device, program or service which stores the public and/or private keys and can be used to track ownership, receive or spend cryptocurrencies. As all cryptocurrencies run on blockchains, cryptocurrency wallets can be referred also as blockchain wallets. Up to now, blockchain wallets was mostly used for cryptocurrency asset holding and exchange.

10.1. FOURwaL SOLUTION

With a single purpose, the 4thTech wallet (i.e., FOURwaL) serves as a blockchain gateway, a tool for 4thTech web platform access. It provides a secure way to connect to the 4thTech blockchain protocols (i.e., FOURid, FOURdx, FOURns, FOURim) as it contains a pair of public and private cryptographic keys. A public key allows for other

wallets to execute 4thTech services to the desired wallet's address, whereas a private key enables the decryption of communication such as data files and short messages from the sender address.

10.2 MAIN WALLET FUNCTIONS;

- to serve as a gateway connecting user with on-chain services;
- to enable on-chain digital identity;
- to enable wallet to wallet data exchange and comunication;
- to act as a on-chain data file and message exchange transaction signing tool
- to be used as a cryptographic token (i.e. FOUR, ETH, TOL, EDG, SOL) gas wallet;
- to manage the public and private keys;
- to be used for private keys backup.

10.3. BUILD & SECURITY

The FOURwaL is fully operational within the ecosystem of Chromium and Firefox browsers and performs tech specific features neaded for services execution. FOURwaL utilises advanced encryption standard (i.e. AES), with a combination of RSA encryption and hash algorithm 256 (i.e. SHA 256) to secure immutable data exchange. FOURwaL contains a pair of public and private cryptographic keys. A public key allows for other wallets to execute data communication to the desired wallet's address, whereas a private key enables the decryption of data from that address.

**More FOURwaL related information: https://wiki.the4thpillar.com/intro/discover.html#fourwal-4thtech-multi-chain-client-app-wallet*

*****Quote;*** *"We build the 4thTech add-on from the ground-up. The challenge was to build the ADD-ON with a unique blockchain document exchange feature and it took four engineers over a year to do it. I can say with certainty that the 4thTech add-on code is unique and the first of its kind! "*

Denis Jazbec, 4thtech CTO

11. CLIENT APP WEB PLATFORM

The *4thTech* web platform serves as an onboarding hub accessed by the user via a Google Chrome or Mozilla Firefox web browser with an installed FOURwaL blockchain wallet add-on. It connects and hosts all the deployed *4thTech* protocols and services in one ecosystem, giving the user all in one access.

*****More*** *client app web platform related information: https://wiki.the4thpillar.com/intro/discover.html#_4thtech-client-app-web-platform*

11.1. MAIN SERVICES

(1) digital identity or short FOURid (status: active); (2) data exchange or short FOURdx (status: active); (3) data verification (i.e. notarisation) service or short FOURns (status: active); (4) data encryption service (status: active); (5) off-chain database and repository (status: active); (6) JSON metadata schema (status: active); (7) transaction fee mechanism (status: partly active, partly in development), and; (8) Solana blockchain instant messaging service or short FOURim (status: in development).

11.2. BUILD

As a part of the 2.0 update, the *4thTech* web platform codebase was rewritten with TypeScript and has overgone the crucial performance upgrade from Vue 2 to Vue 3. New features and functions are embedded, so the user experience can be as intuitive as possible. The 2.0 update includes automatic electronic data verification (i.e. FOURns), while the blockchain network address recognition system simplifies the data file exchange (i.e. FOURdx) process. The *4thTech* web platform 2.0 enables users to solve important technical blockchain challenges within a niche sector of data exchange while supporting Ethereum, HashNet and Polkadot-Edgeware public and private chains.

*****Note:*** *To log in to the 4thTech web platform, please follow this link. https://app.4thtech.io/*

12. FOUR-TOKEN, ECOSYSTEM NATIVE MULTI-CHAIN ASSET

A multi-chain non-dilutive asset, a technical component that enables *4thTech* tokenization with staking and transaction discounts.

Developed and deployed in 2018, FOUR acted as one of the technical components needed for the *4thTech* ecosystem tokenization on Ethereum network, combining three technical utility features; (1) embedded TTS interface (i.e., token teleportation-service); (2) MTO (i.e., multiple-

transfer option), and; (3) GAS feature. Due to Ethereum gas prices increase, the ERC-20 FOUR had to evolve to become a multiverse asset occupying the space of multi-chains, while being used as the primary means to enable *4thTech* services, services discounts, incentivize participants and provide a default mechanism to store and exchange value.

12.1. FOUR SMART CONTRACT

FOUR's smart contract design implements; (1) the ERC-20 interface that can be used with any Ethereum native blockchain wallet (ERC-20 standard allows FOUR to integrate with most of EVM compatible Layer 2's or Side Chain's and various DeFi application platforms); (2) embedded TTS interface (i.e. token teleportation-service), that enables wallet accounts to use FOUR natively as gas, and; (3) MTO (i.e. multiple-transfer option), settlement service that conserves blockchain network transactions and bundles signed multiple transactions together and settles them on the blockchain as one transaction.

12.2. ECONOMY

The *4thTech* economy utilises FOUR as a unit of value on the web platform that enables token holders with the right to access applications and earn services discounts by staking FOUR in the ecosystem.

12.3 UTILITY

4thTech token (i.e., FOUR) is the ecosystem native utility token, used as the primary means to enable services, incentivize participants. It represents a unit of value with the right to stake, right to signal and access to services discounts while enabling ecosystem tokenization.

12.4. TECHNICAL ERC-20 FOUR INFORMATION

- Ethereum / ERC-20 FOUR
- Name: The 4th Pillar Token
- Symbol: FOUR
- Token smart contract address: 0x4730fb1463a6f1f44aeb45f6c5c422427f37f4d0
- Ticker colour: black, grey, 4thTech blue
- Decimals: 18
- Blockchain explorer: https://etherscan.io/token/0x4730fb1463a6f1f44aeb45f6c5c422427f37f4d0
- Utility: TTS, MTO, GAS, right to stake, right to access, right to signal

**__More__ token related information: https://wiki.the4thpillar.com/intro/token.html#smart-contract*

12.5. FOUR, A MULTI-BLOCKCHAIN ASSET

Cross-chain interoperability of ERC-20 FOUR with other blockchains essentially increases the decentralisation of liquidity and unlocks a universe of possibilities for further development. The users instantly benefit from lower fees and the native DeFi economy of the bridged blockchain. With an unchanged total and circulating token supply, the FOUR ERC-20 currently exists on its native Ethereum blockchain, while a wrapped synthetic version exists on the bridged blockchains such as Binance Smart Chain and Solana.

13. FOUR STAKING

FOUR staking provides FOUR holders with rewards in the form of service fee margin discounts, while it enables the FOURim (i.e. instant messaging protocol) right to access.

By staking, the user agrees to lock up their FOUR tokens for a certain period, during which they are unspendable. However, FOUR staking provides FOUR holders with rewards in the form of services fee margin discounts. Furthermore, by staking FOUR, users actively support the 4thTech ecosystem by allocating resources to it and contribute to the stability of the network. FOUR staking acts on behalf of user benefit to secure services fee margin discounts when executing FOURdx (i.e blockchain electronic data and documents exchange). Minimalistic and intuitive web platform design enables users to stake FOUR with a single click.

13.1. SERVICE FEEs

With the FOUR staking deployment, *4thTech* will start to charge services fee margin in cryptographic tokens to execute data exchange from wallet to wallet. The total public-chain service fee is based on; (1) chosen public blockchain network TX cost, and; (2) added *4thTech* service fee margin.

(1) Public-blockchain network TX cost is based on two TX needed to execute data exchange (i.e. FOURdx) and 4thTech services fee margin. The

first TX saves the link to the metadata file and checksum of the metadata file to the SC as the second TX sends the transaction fee in the native token (i.e. ETH, EDG, TOL, SOL) to the solution fee taker address.

(2) 4thTech services fee margins are defined in FIAT but converted in ETH, EGD, TOL, SOL or FOUR based on the market exchange rate. (TX GAS_PRICE FEE depends on the public blockchain network selected).

**Note:* *4thTech services fee will be defined parallel to the staking protocol deployment.*

14. 4THTECH ELEMENTS

14.1. SMART CONTRACTS

Smart contacts are essentially code or rules written into a digital program and were written to facilitate *4thTech* unique requirements.

In the case of FOURdx, a smart contract executes the following; (1) saving unique ID (e.g. represent a unique id of the data file); (2) deliver links (i.e. represents a link of the data file); (3) represent a name (i.e. represent the name of the data file), and; (4) provide a description (i.e. represents a description of the data file).

In the case of FOURim, a smart contract executes the following; (1) saving instant messages from the sender; (2) retrieving instant messages from receivers.

In the case of FOUR STAKING, a smart contract executes the following; (1) transferring tokens from sender to contract address; (2) creating lock schedule metadata with locking details (e.g. token amount, lock period, transaction cost discount, etc); (3); enable the transfer of tokens from contract to sender address once lock period is over.

14.2. STORAGE

A database represents an organized collection of data, stored and accessed electronically. There are 4 databases forming in the 4thTech system;

(1) **MySQL database** is used to store; (1) user nicknames; (2) platform settings; (3) user wallets, and; (4) RSA public key for data encryption. Data exchange within the MySQL database is protected with an HTTPS connection and a firewall. In the case of a user request, it is possible to delete any user-related data to comply with GDPR regulation;

(2) **data file cloud repository** is used for the temporary 7-days storage of encrypted data files that are exchanged between wallets in the FOURdx process. The decryption of the data files is possible only with a private key of the user. Data file cloud repository is protected by a firewall. In the case of a user request, it is possible to delete any user-related data to comply with GDPR regulation;

(3) **local storage** is used to store; (1) FOURwaL private keys; (2) FOURim short messages, and; (3) user-initiated backup of conversations, data files and reports. The security of local storage is in the users domain;

(4) **blockchain** (Ethereum, Tolar, Edgeware, Solana) is used to store; (1) a link to the encrypted metadata file and timestamp (FOURdx); (2) encrypted message, timestamp and sender address (FOURim). The overall security of the blockchain network depends on its decentralization, while the access security depends on the users private key safety measures.

14.3. MULTI-BLOCKCHAIN INTEROPERABILITY

Multi-blockchain support enables transaction cost and speed choice, which is especially important when dealing with public blockchains. Next, to already supported Ethereum, two additional blockchains were added, both chosen based on their uniqueness. The support for HashNet protocol was added already in July 2020, while Edgeware, a Polkadot Substrate was added in v2.0. HashNet DLT is a ground platform we find essential to building the application that can handle a high volume of transactions that are furthermore, fairly recorded and immutable, while the platform ensures valid, scalable usage which makes it perfect for Enterprise applications. Edgeware is a high-performance, self-upgrading WASM smart contract platform, in the Polkadot ecosystem. It is a Substrate based blockchain built using the Rust programming language. Smart contracts are written in Ink! programming language. Ink! is a Rust-based eDSL for writing Wasm smart contracts specifically for the Contracts module. Special logic was added into programing, which enables us to add additional blockchain support when needed. Solana blockchain support was added in Q2 2021 to enable a secure affordable Layer 1 instant messaging

solution. According to Solana (*Scalable Blockchain Infrastructure: Billions of Transactions & Counting | Solana: Build Crypto Apps That Scale*, n.d.), Solana is the next generation censorship-resistant blockchain with over 500 validators, extreme transaction speeds and low cost, therefore perfect for Layer 1 on-chain instant messaging. Solana leverages Proof of History and several other breakthrough innovations to allow the network to scale at the rate of Moore's Law.

4thTech uses hosted Ethereum-node on Infura over JSON-RPC protocol, to connect to the Ethereum node. In the case of HashNet protocol, 4thTech uses Tolar Gateway which transforms JSON-RPC calls to gRPC (i.e. universal RPC framework) calls to connect to the HashNet node. In the case of connecting to the Polkadot/Edgeware and Solana node, 4thTech uses JSON-RPC protocol.

14.4. SYSTEM SCALABILITY

4thTech has been up and running for the past three years. This time was also spent exploring and developing solutions regarding project scalability.

In the case of *4thTech* blockchain applications development, developed Docker containers will be integrated into Kubernetes clusters, which will enable the overall scalability and elasticity of the *4thTech* systems.

14.5 SECURITY PROTOCOLS

4thTech utilizes advanced encryption standards (i.e. AES), with a combination of RSA encryption and hash algorithm 256 (i.e. SHA 256) to secure immutable data communication. The data is encrypted with a symmetric algorithm (i.e. AES), as the asymmetric algorithm (i.e. RSA) is used to encrypt the symmetric key and initialization vector (i.e. IV) with the public key of the receiver.

4thTech encryption design does not allow an attacker to infer relationships between segments of the encrypted message. SHA 256 is defined as one of the most secure ways to protect digital information. SHA 256 is a mathematical process that generates a 256 bit (64 characters long) random sequence of letters and numbers (hash) out of any input. Secure hash algorithm 256 is used to calculate the file content hash value when executing an on-chain data file exchange transaction via smart contract.

15. *4THTECH* REVENUE MODEL

According to *The Best Blockchain Business Models | Blockchain Council*, n.d., blockchain has grabbed the attention of a majority of the industrial verticals out there. Not only is it transforming the way a business functions, but it is also enabling innovation at a rapid pace. More and more companies are increasingly adopting blockchain for their businesses as blockchain is one technology that makes it more feasible for mainstream implementation. So far *4thpillar technologies* offer two revenue models, which will form the economic company future.

To address the complexity of blockchain monetization, two pricing revenue models were created; (1) the subscription pricing model is usually based on the private permission-less blockchain, as it is most suitable for regulated users from the private and public sector and civil society, and; (2) the transaction pricing model is based on the network transaction (i.e., pay per transaction). Used on public blockchains, it is most suitable for users that have the necessity for traceability of executed transactions. Both models are viable, as users are coming from two completely different groups. The trade-off is between low-cost private chains with no open transaction traceability and public chains with volatile and in most cases higher prices but publicly traceable transactions.

15.1. PRIVATE-CHAIN SUBSCRIPTION-BASED REVENUE MODEL

Based on the chosen monthly subscription plan, the user will be charged for electronic data transactions. Based on the private-chain deployment agreement the fixed network cost will be specified. Let’s take a look at the subscription tier example;

- ***Tier 1:*** Pay as you go subscription plan
- **Tier 2:** Organization subscription plan: 1000 to 5000 exchanged documents
- ***Tier 3:*** Corporate subscription plan: 5000 to 10.000 transactions
- ***Tier 4:*** Subscription plan: 10.000 to 50.000 transactions
- ***Tier 5***: Enterprise

Specifications:

- ***Network:*** SI-Chain (i.e., HashNet protocol)

- ***Network type:*** private blockchain
- ***Speed:*** 50.000 plus transactions per second

Benefits:

- Fixed price, no volatility
- Fixed speed and performance
- Permission-less

15.2. PUBLIC-CHAIN TRANSACTION-BASED REVENUE MODEL

The user will be charged for *4thTech* services. The transaction fee is used for "gas" to fuel the public chain transactions, so the *4thTech* revenue will come from charging an additional margin on the main chain transaction "gas" fees.

Specification:

- ***Network:*** Ethereum, Tolar HashNet, Polkadot Edgeware, Solana…
- ***Network type:*** public blockchains
- ***Speed:*** depends on the network stress
- ***Actual transaction cost:*** variable (determined by native chain price)
- ***Margin set in FIAT:*** fixed
- ***Public-chain transaction payment:*** FOUR, ETH, TOL, EDG, SOL
- ***Price calculation:*** dynamic (each time a user connects, current transaction price shows).

Benefits:

- Users' transaction discount when staking FOUR
- Transparency (open public transaction traceability)
- Open-source
- Self-integration (infrastructure and developer tools will be available publicly)
- Fast solution
- Permission-less

16. *4THTECH* AS MULTI-BLOCKCHAIN APPLICATION

With the second-chain deployment, *4thTech* already established its multi-chain presence in July 2020. With the latest editions, *4thTech* 2.0 supports; (1) Ethereum main public-chain; (2) SI-Chain private-chain (running HashNet protocol); (3) Tolar HashNet main public-chain; (4) Polkadot/Edgeware public-chain, and; (5) Solana public blockchain.

There are several strategic advantages to multi-blockchain application interoperability; (1) the option to choose based on the network transaction price; (2) the option to choose based on the transaction speed; (3) the option to choose based on the network governance; (4) the option to choose based on the network congestion; (5) the option to choose based on the network interoperability; (6) the option to choose based on the network immutability, and (7) the option to choose based on the network infrastructure type.

**More* multi-chain related information:*
https://wiki.the4thpillar.com/intro/elements.html#multi-blockchain-interoperability

16.1. WHY ETHEREUM?

Ethereum network is one of the most used blockchains in the world. Enterprise blockchain applications are being built on the public permissionless Ethereum main net and private blockchains based on Ethereum technology. After intensive testing on Kovan (i.e., Ethereum test net), *4thTech* was deployed at Ethereum main net in April 2018 and is running now nonstop for over 2 years, providing Ethereum based enterprises and users access to *4thTech* services.

16.2. WHY TOLAR HASHNET?

HashNet is a scalable, fast, secure, and fair decentralized-beyond blockchain project, leveraging Distributed Ledger Technology (DLT) and consensus algorithm which keeps all positive characteristics of blockchain technology while increasing throughput to more than 50,000 transactions per second (tolar.io, 2019). HashNet is 100% secure and according to developers, it can't be hacked due to the power of the distributed algorithm. Also, combining Proof-of-Stake and master node creates transparency, since the participants are compensated for correct voting. The network is using Proof-of-Stake with master nodes, which eliminates the need for massive energy consumption. *4thTech* blockchain applications were deployed at SI-Chain in July 2020. SI-Chain is a HashNet protocol powered Slovenian National Pilot Infrastructure. With *4thTech* deployment on SI-Chain, 4thtech applications now enable HashNet based enterprises and public chain users with adoption solutions. HashNet protocol was designed with

unique characteristics such as transaction speed and scalability, which makes it a perfect Enterprise blockchain underlying infrastructure for *4thTech* solutions.

16.3. WHY POLKADOT?

According to Polkadot (*POLKADOT: VISION FOR A HETEROGENEOUS MULTI-CHAIN FRAMEWORK*, n.d.), Polkadot is a sharded blockchain, meaning it connects several chains in a single network, allowing them to process transactions in parallel and exchange data between chains with security guarantees. Thanks to Polkadot's unique heterogeneous sharding model, each chain in the network can be optimized for a specific use case rather than being forced to adapt to a one-size-fits-all model. The whitepaper also states that by bridging multiple specialized chains together into one shared network, Polkadot allows for multiple transactions to be processed in parallel. This system removes the bottlenecks that occurred on earlier networks that processed transactions one-by-one. *4thTech* 2.0 is currently being deployed at, Polkadot-Edgeware, where the compatibility and smart contract tests are being performed. Due to Polkadot's ability to bridge blockchains, *4thTech* compatibility with Polkadot plays a vital role in future cross-chain interoperability. The *4thTech's* Polkadot ecosystem deployment enables future interaction like electronic data and documents exchange with external networks like Ethereum, where *4thTech* is already deployed.

16.4. WHY SOLANA?

According to Solana.com, Solana is the next generation censorship-resistant blockchain with over 500 validators, extreme transaction speeds and low cost, therefore perfect for Layer 1 on-chain short messaging. Solana leverages Proof of History and several other breakthrough innovations to allow the network to scale at the rate of Moore's Law. According to Solana, the average transaction confirmation is 0.89s, with up to 50.000 TPS capacity and transaction (i.e., TX) price of 0.00025$ (21.5.2021), which theoretically enables almost real-time messages to exchange with low TX cost.

17. INDUSTRY AND BUSINESS APPLICATIONS

4thTech blockchain solutions enable a decentralised, interoperable and immutable management of digital identities, electronic data and documents exchange and enable features such as document notarisation, more importantly, blockchain technology can enable eradication of inaccessibility, data insecurity and identity theft. Digital transformation is crucial to today's society, economy, technology and blockchain offer to solve just that. Let's take a look at *4thTech* solutions and various use cases specified according to; (1) solutions; (2) proof, and; (3) industry sectors.

17.1. SOLUTION BASED USE CASES

17.1. DIGITAL IDENTITY

Digital identity mechanism accompanied by X.509 digital certificate standard can enable users to map their digital identity provided by a state-issued digital certificate (i.e., X.509 standard) with their blockchain wallet address.

17.2. DOCUMENT SIGNING

Acrobat Reader, a Digital identity mechanism accompanied with X.509 digital certificate standard and document exchange protocol can enable users to send and receive PDF documents signed with their X.509 standard digital certificate over the blockchain in their *4thtTech* wallets.

17.3. DIGITAL DATA EXCHANGE

4thTech blockchain digital data and document exchange protocol enables the safe, immutable, decentralised exchange of digital data and documents between blockchain wallet addresses.

17.4. DATA NOTARISATION

4thTech digital identity protocol accompanied by X.509 digital certificate standard, blockchain data exchange protocol and blockchain notarisation service can enable users to check the received document time-stamp and verify authenticity with transaction checksum.

17.5. PROOF-BASED USE CASES

17.5.1. PROOF OF DOCUMENT TIME-STAMP

4thTech data exchange protocol accompanied by blockchain notarisation service enables the possibility to prove the exact transaction time of the exchanged electronic data files and documents by verifying blockchain transaction data.

17.5.2. PROOF OF DATA FILE OR DOCUMENT OWNERSHIP

4thTech digital identity protocol accompanied by X.509 digital certificate standard, data file and document exchange protocol and blockchain notarisation service can enable users to prove the send data ownership and authenticity.

17.5.3. PROOF OF DATA FILES AND DOCUMENT EXISTENCE

4thTech data exchange protocol accompanied by blockchain notarisation service enables the possibility to prove that the exchanged digital data files and document exists and provides the verification through blockchain transaction data.

17.6. INDUSTRY USE CASES

17.6.1. SECURE TRAVEL

With the power of *4thTech* data files and document exchange solution and digital identity protocol, we can enable the future of international travel with immutable sensitive document exchange for documents such as plane tickets, health certificates, digital ID and more.

17.6.2. HEALTHCARE RECORDS

Digital identity protocol accompanied by X.509 digital certificate standard and blockchain document exchange protocol can enable patients to receive, share and manage their health records securely anywhere and anytime. Using *4thTech* storage with military-grade SHA 256 encryption (i.e., document decryption is only possible with a patient private key).

17.6.3. PUBLIC SECTOR

Data exchange protocol accompanied with blockchain notarisation service enables the public administrators to exchange digital data and documents with other public administrations, businesses and citizens, in an interoperable, secure, reliable and trusted way. Blockchain electronic data and document exchange and eDelivery has significant advantages, compared to traditional eDelivery, as it is based on a decentralised model and uses blockchain as a “trust” source, public sector users can now prove the document transaction time, origin and more.

17.6.4. PERSONAL USE

Data and document exchange protocol accompanied with blockchain notarisation service enables users to exchange (i.e send or receive) any kind of personal, legal, financial or another kind of documents, such as real estate’s ownership clauses, marriage or birth certificates, will testimonies, private photos, videos and more. In short, *4thTech* offers a solution where electronic data and documents transactions can be processed safely and with no third-party intermediary.

17.6.5. LOGISTICS

Data and document exchange protocol accompanied by blockchain notarisation service enables logistic companies to cut costs and improve cargo tracking. For ocean cargo carriers, *4thTech* blockchain technology allows participants to share information as goods move through a maritime focused supply chain.

17.6.6. FINANCIAL SERVICES;

Digital identity protocol accompanied by X.509 digital certificate standard, data file and document exchange protocol and blockchain notarisation service enables financial services to move their client acquisition and management completely online and achieve complete digital transformation.

17.6.7. REAL-ESTATES

Digital identity protocol accompanied by X.509 digital certificate standard, data file and document exchange protocol and blockchain notarisation service enables wide applications to real estate such as contract exchange between clients, document exchange in cases of property management and other.

18. LEGAL

18.1. PERSONAL DATA PROTECTION

We are firmly committed to protecting collected and processed personal data and designing our solutions in compliance with the individual’s data privacy, which will be protected at the highest level. We have already carried out the legal analysis of the *4thTech* habitat for personal data protection issues with the help of external legal service providers to ensure that what we pursue is

feasible. We will make sure that all processes of individual's data will be audited and acquire certifications of our conduct, procedures and security measures regarding personal data by respective certification authorities under the EU General Data Protection Regulation. They users will be able to withdraw their data. The blockchain digital data and documents exchange protocol *(i.e., FOURdx)* does not store the transmitted data and documents on-chain. The data and documents are stored off-chain. The protocol records links to encrypted files and hashes of the encrypted content on the blockchain. This safeguards the rights of individuals to confidentiality and privacy. This safeguards the rights of individuals to confidentiality and privacy.

**Note:* *Currently centralized off-chain storage Is used, that complies with the mentioned directives, when a decentralized storage option will be available, the solutions to compliance will be addressed.*

18.2. LEGISLATION AND REGULATION IMPACT

According to the article *Regulating emerging technology | Deloitte Insights*, n.d.), regulatory leaders are faced with a key challenge: how to best protect citizens, ensure fair markets, and enforce regulations, while allowing new technologies and businesses to flourish? In this time, companies and organisations are already using different centralised systems for exchanging and storing sensitive personal digital documentation within the organisation as well as between the organisation and individuals.

18.3. LEGAL IMPACT

As the use of blockchain technology will start to emerge, so will the need for a legal framework. The European Commission is currently working on the legal framework for smart contracts enforceability, along with solving the question of issuing and trading tokens (i.e. crypto assets), when they are not considered as financial instruments. (*Blockchain Technologies | Shaping Europe's Digital Future*, n.d.)

18.4. REGULATORY AND RISK MIGRATION

The exchange (i.e., swap) of the four-token is available on the designated exchanges and de-fi protocols and it is not a public offering of equity or debt and, consequently, does not fall under securities or any prospectus regulation. The four-tokens are not securities as defined under applicable laws. Therefore, the four-tokens have not been registered with any competent regulator. The exchange (i.e., swap) of the four-tokens is unregulated. Changes to legislation in the most relevant jurisdictions in the world are closely monitored. Appropriate actions will be undertaken to act accordingly if regulatory changes impact the four-token exchange and operations. We are not a financial institution and are currently not under the supervision of any financial supervisory authority. We do not provide any licensed financial services, such as investment or brokerage services, capital raising, fund management or investment advice.

18.5. EU LAW COMPLIANCE

The *4thTech* solutions are and will be developed according to the requirements of the; (1) Regulation (EU) No 910/2014 of the European Parliament and of the Council of 23 July 2014 on electronic identification and trust services for electronic transactions in the internal market and repealing Directive 1999/93/EC (eIDAS); (2) Regulation 2016/679 of the European Parliament and of the Council of 27 April 2016 on the protection of natural persons with regard to the processing of personal data and on the free movement of such data, and repealing Directive 95/46/EC (GDPR); (3) Regulation (EU) 2018/1724 of the European Parliament and of the Council of 2 October 2018 establishing a single digital gateway to provide access to information, to procedures and to assistance and problem-solving services and amending Regulation (EU) No 1024/2012, and; (4) Directive (EU) 2016/1148 of the European Parliament and of the Council of 6 July 2016 concerning measures for a high common level of security of network and information systems across the Union. *4thtech* solutions will strive to the full compliance with all applicable EU legislation. In addition, it will contribute to establishing best practices and guidelines on how to implement blockchain solutions.

18.6. BLOCKCHAIN, GDPR AND LEGAL INTEROPERABILITY

The General Data Protection Regulation (GDPR) is a legal framework that sets guidelines for the collection and processing of personal information from individuals who live in the European Union (EU). The GDPR mandates that EU visitors be given a number of data disclosures. General Data

Protection Regulation ("GDPR") compliance is not about the technology, it is about how the technology is used. There are many tensions between the GDPR and blockchain technology, but they are due to two overarching factors; (1) the first is that the GDPR requires an identifiable controller against whom data subjects can enforce their legal rights under EU data protection law, and; (2) the GDPR requires that data can be modified or erased where necessary to comply with legal requirements.

Sending personal data through the blockchain presents quite a big legal challenge. GDPR demands responsibility for ensuring compliance, which can become demanding, especially in the permissionless public blockchain network. GDPR allows personal data processing only in the case of explicit authorization by the subject.

To achieve legal interoperability, *4thTech* solutions are designed and built according to the EU and GDPR guidelines with main GDPR compliance features; (1) transaction is authorized by the user; (2) blockchain network is used for transactions that include encrypted electronic data or document link, that only the receiver can open using his or her private key; (2) no personal information is located in the blockchain transaction; (3) send encrypted electronic data or documents are stored in the off-chain data repository (i.e. data repository of user choice and control) and can be erased on the user request; (4) the protocol records only links to encrypted files and hashes of the encrypted content on the blockchain, what safeguards the rights of individuals to confidentiality and privacy, and; (5) the sender and the receiver jointly assume responsibility for complying with the GDPR and establishing a lawful basis.
According to Fridgen Nikolas Guggenberger Thomas Hoeren Wolfgang Prinz Nils Urbach Johannes Baur et al., n.d., this GDPR-blockchain solution falls under "pseudonymization" approach in which, data on the blockchain is pseudonymized so that it only qualifies as personal data in relation to those participants who possess certain additional information that allows attribution of the data to a natural person.

As blockchain technology becomes more widely used in support of new types of decentralised applications and platforms, lawmakers and regulators will increasingly find themselves faced with challenging questions. As we are developing 4thTech applications and protocols we had to develop them according to guidelines of the European Union legislation, especially Regulations eIDAS and GDPR.

**Note:* *The 4thTech protocol does not store any personal data on the blockchain. The data is stored off-chain. The protocol records links to encrypted files and hashes of the encrypted content on the blockchain. The hashing of exchange data enables the GDPR compliance, for example, if there were a request to delete some data (i.e., documents), the network controller would be able to delete the requested data from off-chain storage, leaving what would then become an empty hash on-chain.*

20. FURTHER DEVELOPMENT

The further development will be focused towards deployment of an Enterprise Access Point, that is a key to connectivity between existing enterprise systems and *4thTech* blockchain solutions. To connect to existing enterprise server backend systems, a high-end blockchain-enabled Access Point (i.e., AP) is needed. Govern by an Application Program Interface (i.e., API), the Access Point will serve as a connection point between existing enterprise IT infrastructure (i.e. ERP) and blockchain network. *4thTech* AP will be designed according to enterprise needs, in the same role, it will act as an enterprise blockchain gateway and wallet, a connecting point and a bridge between both worlds.

21. CONCLUSION

At this moment blockchain adoption brings various challenges from legal to technical. It is imperative to identify beneficial adoption use-cases and start small, 100% adoption will not come overnight. What does every organization need and already use, that can be done better? Every organization exchanges digital data in one form or the other, is it payslips, contracts, merchandise manifests, cargo documents. With the help of advanced blockchain protocols (i.e., Ethereum, HashNet, Polkadot, Solana ...) as an underlying infrastructure, *4thTech* provides a suitable blockchain adoption toolbox, helping individuals and organizations on their way towards the adoption of this new advanced technology. Despite the current adoption challenges, early blockchain technology adopters will be able to secure a considerable advantage in regards to technology understanding and tailored use-case solutions. Blockchain technology adoption is here with

technology-specific solutions that will change the digital landscape as we know it.

22. DISCLAIMER

4thTech is a blockchain technology innovation and development initiative. Its main focus goes to the development of future experimental blockchain technology. 4thTech does not guarantee or influence the token price or deal with financial or trading token elements, nor offer any licensed financial services, such as investment or brokerage services, capital raising, fund management, or investment advice. The content of this whitepaper is provided for information purposes only and is not to be used or considered to be an investment recommendation or an offer or solicitation to buy, sell or subscribe to any securities or other financial instruments.

**__Note:__ Prepared and updated with care by the 4thTech team.*

References

4THPILLAR TECHNOLOGIES Layer 1 blockchain instant messaging (i.e. FOURim) Light Paper. (n.d.). Retrieved July 5, 2021, from http://adriatic-council.eu/beyond-4-0-ljubljana-2018/

Adriatic Council | BEYOND 4.0 – LJUBLJANA, 25.05.2018. KRISTALNA PALAČA (BTC). (n.d.). Retrieved March 28, 2020, from http://adriatic-council.eu/beyond-4-0-ljubljana-2018/

blockchain-for-digital-identity. (n.d.). Retrieved December 31, 2020, from https://www.nec.com/en/global/solutions/blockchain/blockchain-for-digital-identity.html

Blockchain Technologies | Shaping Europe's digital future. (n.d.). Retrieved May 5, 2020, from https://ec.europa.eu/digital-single-market/en/blockchain-technologies

Blockchain Technology Market Size, Share | Industry Report, 2019-2025. (n.d.). Retrieved March 8, 2020, from https://www.grandviewresearch.com/industry-analysis/blockchain-technology-market

Cryptocurrency wallet - Wikipedia. (n.d.). Retrieved March 7, 2020, from https://en.wikipedia.org/wiki/Cryptocurrency_wallet

Economic Commission for Europe Executive Committee Centre for Trade Facilitation and Electronic Business Blockchain in Trade Facilitation: Sectoral challenges and examples. (2019).

Fridgen Nikolas Guggenberger Thomas Hoeren Wolfgang Prinz Nils Urbach Johannes Baur, G., Brockmeyer, H., Gräther, W., Rabovskaja, E., Schlatt, V., Schweizer, A., Sedlmeir, J., Wederhake, L., Babel, M., Brennecke, M., Camus, P., Drasch, B., Guggenberger, T., Lämmermann, L., Lockl, J., Radszuwill, S., Rieger, A., Schmidt, M., Thanner, N., … Dlt, V. (n.d.). *E WA NDT E I NF ORM AT I O NST EC H NI K FI T*.

POLKADOT: VISION FOR A HETEROGENEOUS MULTI-CHAIN FRAMEWORK. (n.d.). Retrieved December 31, 2020, from https://github.com/ethereum/wiki/wiki/Chain-Fibers-Redux

Regulating emerging technology | Deloitte Insights. (n.d.). Retrieved May 5, 2020, from https://www2.deloitte.com/us/en/insights/industry/public-sector/future-of-regulation/regulating-emerging-technology.html?id=gx%253A2sm%253A3tw%253A4FoRPart12018%253A%253A6Public_Sector%253A20180623170500%253AGlobal&linkId=53371991

Scalable Blockchain Infrastructure: Billions of transactions & counting | Solana: Build crypto apps that scale. (n.d.). Retrieved July 5, 2021, from https://solana.com/

The Best Blockchain Business Models | Blockchain Council. (n.d.). Retrieved May 5, 2020, from https://www.blockchain-council.org/blockchain/the-best-blockchain-business-models/

The second half of the internet. (2019). *The Economist*, *431*, 21–25.

Time For Trust: How blockchain will transform business and the economy - PwC. (n.d.). Retrieved December 31, 2020, from https://www.pwc.com/gx/en/industries/technology/publications/blockchain-report-transform-business-economy.html

tolar.io. (2019). *Tolar - Next-gen cryptocurrency*. Tolar.Io. https://www.tolar.io/