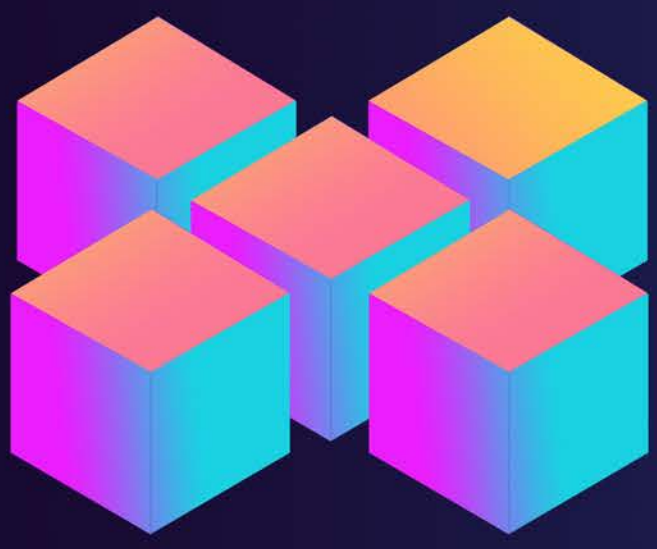


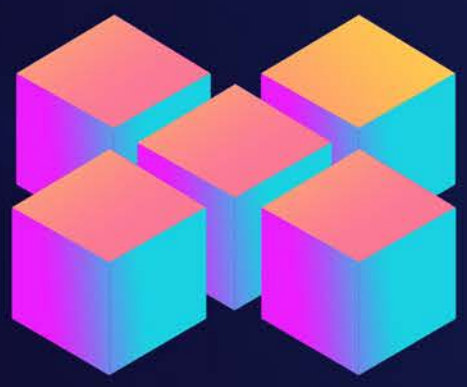
TETRIX

BRIDGING THE GAP AMONG BLOCKCHAINS

WHITEPAPER

https://www.tetrix.xyz TetrixNetwork info@tetrix.xyz

TETRIX NETWORK:
Omnichain Interoperability Protocol



BRIDGING THE GAP AMONG BLOCKCHAINS

HTTPS://TETRIX.XYZ

ABSTRACT

Existing blockchain technology such as Bitcoin, Ethereum suffers from several issues that render them unsuitable for mass adoption. into the current technical architecture and scalability. We believe these issues stem from tying two very important parts of the consensus architecture, namely canonicality and validity, too closely together. The current architecture cannot scale to a level that is required for consumer-grade applications to function.

This paper presents Tetrix, a trustless omnichain interoperability protocol, which provides a diverse set of cross-chain applications that are built on top of the Tetrix blockchain. Using this architecture, developers can implement inter-chain applications without having to rely on a middleware approach. Simply put, Tetrix is the first omnichain protocol that directly communicates across all blockchains. Allowing data to freely flow between all existing blockchains and decentralized applications. With Tetrix, we provide the gateway of data to exist between existing blockchains.

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INTRODUCTION

MOTIVATION

The Tetrix Network is a project that began in 2020 as an effort to change the way blockchains are designed and developed for the digital space where communities, enterprises, governments, and individuals interact and coexist in the same ecosystem without having to worry about different blockchains. The overall focus beyond a particular set of innovations is to provide a sustainable ecosystem that better accounts for the needs of its users as well as other system projects seeking integration without having to rely on a single entity controlling the blockchain and any actions on the blockchain are verifiable and irreversible.

In the spirit of many open source projects, Tetrix did not begin with a comprehensive roadmap or even an authoritative white paper. Rather, it embraces a collection of design principles, engineering best practices, and avenues for exploration. These include but are not limited to the following:

- Implementation of core components in a modular functional architecture
- Implementation of post-deployed systems without destroying the network
- Development of a decentralized network architecture for future work
- Advocate the use of blockchain and cryptocurrency to the mass market and ensure mass adoption of the technology
- Abstracting transactions to include optional metadata to better conform to the needs of legacy systems
- A long term view on improving the design of the blockchain and cryptocurrency so they can work on any device with a fast and secure user experience
- Learning from nearly 5000 altcoins and embracing features that make sense
- Adopt a standards-driven process inspired by IETF using a dedicated foundation to lock down the final protocol design
- Explore the social elements of commerce, nfts, and blockchain
- Find a middle ground for regulators to interact without comprising the core principles of blockchain and cryptocurrency as a whole
- Provide a long-lasting community platform consisting of common interests wherein they can discuss and create opportunities that can be funded and hosted by the community

- Implement and develop an interoperable cryptocurrency wallet that handles all of the blockchain networks
- Acquire and create digital assets (NFTs) from and within the blockchain
- Support and provide a platform for content creators and influencers to capitalize on the opportunity to explore blockchain technology
- Generate sponsorships, sales, tournaments, events, products, and services under the blockchain technology

The demand for a diverse set of functionalities spurned the growth of specialized chains. Each of these chains has fostered immense growth in applications within its own ecosystem, but the isolation between these ecosystems has emerged as a key limit to adoption. Users and developers are then forced into a singular blockchain with a set of rules limiting their integration.

TETRIX ARCHITECTURE LAYER

Figure 1: Tetrix Network enables cross-chain data flow

Early blockchain technology serves a set of purposes but is often not well-suited for the needs of specific industries. To meet the demands of modern markets, the Tetrix technology is based on the industry-focused design that addresses the multiple and varied requirements of specific industry use cases, extending the learning of the pioneers in this field while also addressing issues such as scalability. The Tetrix network provides a new approach to enable permissioned networks, privacy, and confidentiality on multiple blockchain networks and interconnecting them into a single point of entry for all blockchain technologies.

Cryptocurrency and smart contract platforms such as Bitcoin and Ethereum have sparked considerable interest and have become promising solutions for decentralized applications and digital stores of value. Due to the limitless potential for opportunity and non-exclusive integration, these have greatly impacted early adopters and communities. However, when compared to their centralized counterparts in key metrics, the state of affairs suggests that present public blockchain interactions exhibit serious limitations, particularly to the wide array of transactions, scalability,

It has proved extremely challenging to deal with the current engineering boundaries imposed by the trade-offs in the current blockchain model. It is highly costly and time-intensive for enterprises to develop, deploy, and maintain distributed applications using unfamiliar coding languages and design patterns. Several solutions have been proposed but few of them have shown significant and viable results. Thus, to solve the scalability and interoperability challenges, a comprehensive reevaluation of the blockchain infrastructure is required. Additionally, scaling applications to the performance demands of the vast majority is practically impossible on top of the current public blockchains. To overcome these technical challenges, blockchain technology requires a protocol that is not only self-sustaining but also scalable, cost-effective, and energy-efficient.

Bitcoin was developed mainly to solve the problem of distributed consensus for financial transactions, but it relied heavily upon an energy-intensive consensus process known as proof-of-work. As scaling debates have escalated, it has led to the creation of several Bitcoin forks such as Bitcoin Cash and Bitcoin Gold. These separate factions are highly divisive and damaging to the ecosystem. Ethereum uses a similar but application-specific integrated circuit (ASIC) resistant proof-of-work consensus algorithm and is moving to a proof-of-stake mechanism, Casper. With proof-of-stake, there is a democratic imbalance between those with the most money get to choose the state of the network through consensus. Ethereum pioneered smart contracts, however, due to their execution, consumer-ready applications are severely bottlenecked.

LAYER DESIGN - TETRIX LAYER

When designing great protocols and languages, one should not look to the future, but rather to the past. History provides a litany of exemplary ideas that are perfect on paper, yet have not survived. An example of this is the OSI standard. History also provides accidents that have endured from TCP/IP to JavaScript.

A cross-chain gateway between blockchains A and B consists of a transaction on A, a communication protocol between A and B, and a message. Valid delivery states that the message is delivered if the transaction is committed and valid. The key idea that the Tetrix protocol bases its foundation on is that if two independent entities corroborate the validity of a transaction, then can it only be sure it is valid.

TETRIX OMNICHAIN

Figure 2: Communication between blockchains

Some principles extracted from history are the following:

1. You cannot predict future demand, so build in scalability and wiggle room
2. Complexity is for the paper, simplicity is for actuality.
3. Once a standard is set, it will probably stick around regardless of whether it is suboptimal
4. Poor ideas can evolve into pretty good ones if refined enough

The Tetrix Network is a blockchain technology that accepts its social nature. There will be a tremendous need for flexibility and the ability to address arbitrary complexity in a particular user's data transaction. If successful, there will be a need for tremendous computational, storage, and network resources to accommodate millions of concurrent requests.

Blockchains are ultimately databases ordering facts and events with guarantees about timestamps and immutability. In the context of data, they order ownership of metadata. Adding complex computation by storing and executing programs is an orthogonal concept.

It is incredibly tempting to use complex solutions like figuring out the whole story between users' transactions and requests and deciding what to do with the data because it is more flexible, but it violates the design principle the blockchain technology was built upon. Figuring out the whole story means that a single protocol has to be able to understand arbitrary events, transactions, permit arbitration, and even potentially reverse transactions and requests when new information is made available.

Then one has to make difficult design decisions about what metadata to store for each transaction and request. Furthermore, some computation is private in nature, we would not necessarily want to disclose all of the data unless specifically asked for.

TETRIXATION OF ASSETS (USER ISSUED DIGITAL ASSETS)

Early in Bitcoin's history, protocols were quickly developed to allow users to issue assets that piggybacked on Bitcoin's accounting system to track multiple currencies concurrently. These protocols were not natively supported by the Bitcoin protocol, but implemented through clever hacks.

In the case of Bitcoin overlays such as Colored Coins and Mastercoin, light clients are forced to rely on trusted servers. Also, transaction fees still have to be paid in Bitcoins. These properties combined with the single pipeline for transaction approval make Bitcoin suboptimal for multi-asset accounting.

In the Ethereum case using the ERC20 standard, there is more feature richness. However, transaction fees still require ether. Furthermore, the Ethereum network is having difficulty scaling to the needs of all the issued ERC20 tokens.

The fundamental problem can be broken into three parts: resources, incentives, and concern. Given these problems, the benefits are tremendous as the native network token of a multi-asset ledger can effectively bridge currency allowing for decentralized market making. Special purpose crypto assets could be issued to provide additional utility such as valuable stable coins like Tether ($USDT), or Barya ($BYA- Tetrix Network stable coin) that are useful for lending and remittance applications.

REGULATION

The harsh reality of all modern financial systems is that as they scale, they accumulate a need, or at least a desire, for regulation. This outcome is generally the result of recurrent collapses due to the negligence of an actor or cabal of actors in a marketplace.

We can reasonably expect the need for scope and efficacy of regulation, but one cannot deny its existence and the zeal with which major governments have enforced it. However, the challenge all regulators face as the world globalizes and cash becomes digital is two-pronged.

First, which set of regulations should be supreme when dealing with a collective of jurisdictions? The outdated notion of Western sovereignty melts when a single transaction can touch a dozen countries in under a minute. Should it simply be whoever wields the most geopolitical influence?

Second, improvements in privacy technology have created a digital arms race where it will become increasingly more difficult to even understand who has participated in a transaction much less who owns a particular store of value. In a world where millions of assets can be controlled with nothing more than a secretly held 12-word mnemonic, how do you enforce effective regulation?

Like all financial systems, the Tetrix Network protocol must have an opinion in its design over what is fair and reasonable. We have chosen to divide between individual rights and the rights of a marketplace.

Individuals should always have sole access to their funds without coercion or civil asset forfeiture. This has to be enforced because not all governments can be trusted not to abuse their sovereign power for their gain. Cryptocurrencies have to be engineered to the lowest common denominator.

The challenge has always been the cost and practicality of enforcement. Small, multijurisdictional transactions are simply too expensive in legacy systems to provide high assurance of recourse in the event of a dispute.

For Tetrix Network, we'll tackle these issues and innovate on two levels. First, through the use of chaincodes (smart contracts) and blockchain technology the terms and conditions of commercial transactions can be better controlled. If all assets are digital, strong guarantees of free commerce can be gained.

Finally, Tetrix's roadmap is the creation of a modular regulation DAO that can be customized to interact with user-written chaincodes (smart contracts) to add mutability, consumer protection, and arbitration. The scope of this project will be outlined in a later paper.

SCIENCE & ENGINEERING

TETRIX CONSENSUS PROTOCOL (TETChain)

The blockchain development community actively seeks new implementations of distributed ledger technology to solve the scalability issue and has so far failed to solve this. The problem remains. How we can process more transactions and perform more services faster and with less cost to the consumers? We propose using the Hyperledger approach, a modular architecture that maximizes the flexibility of blockchain solutions where multiple parties can record transactions directly, without the need for a trusted, central authority to ensure that the transactions are verified.

The Tetrix Consensus (TETChain) protocol implements the Hyperledger architecture with a peer-to-peer layer that can be deployed on any device. The TET protocol allows for large networks to communicate on a scale that is orders of magnitude higher than existing blockchain technologies. Each node on the network keeps track of other nodes when it receives new transactions to be verified, it cultivates that message to all of its nodes in turn.

INSERT TRANSACTION THROUGHPUT TABLE (TPS)
EXAMPLE: BITCOIN 3-4, ETH 15, IOTA (TANGLE) 500-800, TET (?)

SCALABILITY

Distributed systems are composed of a set of computers (nodes/Stacks) agreeing to run a protocol or suite of protocols to accomplish a common goal. This goal could be sharing or transferring a file, data, or digital assets as defined by the protocol.

The most effective protocol gains resources as Stacks joins the network. A file hosted by any Stack can be downloaded much faster on average if many peers are concurrently downloading it. The speed increases because the peers provide resources while also consuming them. This characteristic is what one typically means when stating a distributed system scale.

The challenge with the design of all current cryptocurrencies and blockchain technologies is that they are not designed to be scalable. Blockchains, for example, are usually append-only linked lists of blocks. The security and availability of a blockchain protocol rely upon many nodes possessing a full copy of the blockchain data. Thus, a single byte of data must be replicated among N nodes. Additionally, nodes do not provide additional resources.

Our scalability goals for Tetrix are greatly aided by our consensus algorithm. The TETChain permits a decentralized way to elect a quorum of consensus nodes, which in turn can run more traditional protocols developed over the last few years to accommodate the needs of large infrastructure providers such as Google and Facebook.

The election of a quorum (Validator Processes) means that we have a trusted set of nodes to maintain the ledger for a specific period. It is trivial to elect multiple quorums concurrently and partition transactional requests to different quorums.

Similar techniques could be applied for network propagation and also sharding the blockchain itself into unique partitions. In our current roadmap, scaling methods will be applied to the Tetrix Network starting in 2023 and continue to be a focus in 2024 and 2025.

NODES

These are basic nodes that send transactions and host a user's chain that forms a TET connection with other nodes on the network when any transaction is made and is hashed into blocks.

Since all nodes in the network only vote on proposals from a trusted set of nodes, and since each node may have differing TETs, we also show that only one consensus will be reached amongst all nodes, regardless of TETChain membership. This goal is also referred to as preventing a "fork" in the node network.

A network split detection algorithm is also employed to avoid a fork in the node network. While the consensus algorithm certifies that the transactions on the last-closed ledger are correct, it does not prohibit the possibility of more than one last-closed ledger existing on different subsections of the network with poor connectivity.

In order to identify any occurrence of splits, each node monitors the size of the active members of the TET list. If this size suddenly drops below the threshold, it is possible that a split has occurred.

In order to prevent false positives where a large section of the TETChain has temporary latency, nodes are allowed to publish a "partial validation", in which they do not process or vote on transactions but declare that are still participating in the consensus process, as opposed to a different consensus process on a disconnected subnetwork.

CHECKPOINT PROCESS

These are nodes that process and perform consensus on transactions that fill a buffer and are hashed into blocks. These collections of transactions are hashed and become the next block in the main chain.

VALIDATOR PROCESS

These are validator nodes that run validation processes and host the current chain to nodes on the network.

PEER TO PEER ARCHITECTURE

Our previous sections touch on the architecture of our network and peer-to-peer layer and it shall now be detailed.

STACK

A Stack is the base object in the TETChain. To interact directly with the network, users instantiate a stack node on a device, and transactions are issued through this Stack instance. Each Stack contains a local chain that is composed of its history on the network. This local chain is used to enforce ordering and is identified by the public key, whose private counterpart is used to sign transactions. A Stack itself is a lightweight client for a user to interact with the network and is natively compatible with other devices. However, if a Stack wishes it can elect to participate in consensus which will allow it to appreciate its reputation within the network. If a Stack elects to participate in consensus, then it joins a collection of Stacks, which we refer to as a Stack Link.

STACK LINKS

A Stack Link is a collection of Stacks who have elected to participate in consensus. The total number of stacks is limited by an upper bound, which will be determined after sufficient statistical analysis. When we reach this threshold, a new Stack Link is created and each of them forms locality-sensitive hash blocks. These locality-sensitive hash blocks are then treated like ordinary transactions and hashed.

CHAINCODE-AS-A-SERVICE (CaaS)

Highly available, distributed systems thrive on a serverless architecture. In the case of a distributed operating system, this can be achieved as a network of distributed services. They can send transactions, sign as a counterparty and

perform consensus. The goal is for the chaincode themselves to operate as a Stack providing services for agreed-upon amounts. They serve the same role as smart contracts in Ethereum but in addition provide more complex logic by utilizing the Hyperledger architecture. In addition, they can talk to external programs through an interface. If these services are built with concrete service level agreements (SLA) or better yet, type signature, their composite logic can be chained and composed into distributed applications intuitively. A chaincode can be designed to send and receive data models that improve computational complexity and can be repurposed for new applications.

LAYER SEGMENTATION

This section will discuss the features of the Tetrix Modular Blockchain. The following also serves as an overview of its development phases.

LAYER0

Layer0 is the fundamental layer of any mainchain network. It allows developers to create a seamless integration of blockchain projects under one network (Interchain applications). Having communication directly to a blockchain will also lessen the friction towards building a unified ecosystem of applications that is not reliant on a third-party provider. Tetrix will be creating the TETChain which is our native blockchain project.

TETChain - LayerO
DEVELOPMENT PHASES

STAGE	FEATURE	DESCRIPTION	BUSINESS BENEFIT	NOTES
PHASE 1	Internal Chain	This is the baseline of the entire application.This is the negative blockchain to which will be created with little to no dependency over existing chains.	Our core product hence the selling point throughout the tech. Having our own native blockchain will create a competitive advantage from existing projects.	
PHASE 2	Internal dApp Integration - Template Creation	The blockchain won't work without having a internal dApp support. In line with this, a sample dApp template shall be built in order to provide a template for upcoming developers.This sample dApp template can be as simple as a Todo List app. We intend to make the integration with little friction as possible as what we'll demonstrate on the templates.	Developers need guidance on how to integrate their apps on the TETchain. By creating a template, it should create a good environment to developers that they can start making their own apps under the blockchain. Since this is yet on the internal phase, the main benefit is to test and see how our blockchain accomodates its initial apps.	This is a template that gradually updates as the development progresses. It is important to create one in this phase so that strengths and weaknesses can be identified. For now, the focus is to make a simple app work under the native chain and assess how it can be improved, plus creating a template along the way as documentation.
PHASE 3	Cross-chain Protocol	This is yet to be called "SquareSpan". Developers have the ability to integrate their own projects using the TETchain.	The core feature of the TETchain is create an omnichain solution. By creating a cross-chain protocol, we can enable other blockchain owners to come join our ecosystem of blockchains making a big system of applciations.	This includes validity of transactions wherein parties involved will have to corrobate.
PHASE 4	Concensus Mechanism	Our concensus mechanism will be similarly under a proof-of-stake mechanism wherein it takes less energy to consume with 51% reduction of attack. However, we intend to create a better concensus mechanism that applicable under TETchain so we can have better runtime performance.	Having our own concensus mechanism gives us a more competitive advantage towards existing projects.	At this phase, we stick to proof-of-stake during the initial phases as its proven to be reliant however we'll be building a new concensus on top. Our concensus shall serve as the facilitator for mining and as the

STAGE	FEATURE	DESCRIPTION	BUSINESS BENEFIT	NOTES
PHASE 5	Token Conversion Protocol	While existing exchanges do enable cross-chain token transfer, they do so at a complicating cost. The downsides of this are evident in that cross-chain applications have not seen broad adoption. A solution to the interchain transaction problem is one that uses a single oneswap transaction between chains without involving any other middle entities.	Similar to having our own concensus mechanism, we shall create a oneswap transaction to create a more straightforward approach for token transfer.	
PHASE 6	Abstraction of Blockhain	To be called "Square Span". The idea is for people to have their own TETchain wherein they can pull the blockchain, run it under their machine and build on top of it.	Having not relying on a testnet shall enable developers to develop apps swiftly and with no dependancy on another TETchain. This is free of use under their machine.	This is similar to "Ganache" wherein developers can download it as a local blockchain for development use.
PHASE 7	Support and R & D	Since blockchain development is non-stop, especially given that it's still at its infancy stage, support and R & D shall be continuous from this point.	Discovery of new cases is important as the project progresses.	

RELATED CHAINS

These are projects that are similar to our project. The table below shows their description to help us differentiate their chain versus the Tetrix Blockchain.

CHAIN	ALIAS/ TOKEN-EQUIVALENT	DESCRIPTION	HOW IS TETchain DIFFER?	LAYER TYPE
Ethereum	**ETH**		Significally less gas fees and better output.	LAYER 1
Ethereum 2.0	**ETH**	A proposed upgrade to ethereum with better long-term support.	Significally less gas fees and computing time.	LAYER 1
THORChain	**RUNE**	A DEX that uses pairwise liquidity pools to transfer tokens between third-party chains.	Unfortunately, while RUNE solves this scalability problem, it is a cumbersome overhead in the transaction process that makes a simple operation quite complicated. This is evident in the complexities of the THORChain transaction algorithm.	LAYER 1
AnySwap	**ANY**	A DEX geared towards easy pairwise token exchanges, similar to THORChain.	Like with THORChain, the use of the ANY intermidiate token introduces undesirable overhead, delay, and additional transfer fees.	LAYER 1
Cosmos	**Cosmos**	A blockchain network technology that allows arbitrary messages to be sent between supported chains.	TETchain can run an Inter-Blockchain Communication (IBC) on different types of chain protocols and IBC only provides direct communication on chains.	LAYER 2
Polkadot	**Polkadot**	Is an early example of the potential open cross-chain ecosystem. Many domain-specific, parallel chains ("parachains") connect via a common relay chain that enables tokens and data to follow between them.	Inter-chain communication always crosses a common relay chain, thus incurring additional costs. TETchain provides the same low-level communication platform of Polkadot, without involving the extra transactions necessitated by the on-chain middleman.	LAYER 2
Chainlink	**Chainlink**	A framework for building and connecting to decentralized oracle networks (DONs).	By leveraging the Chainlink DON framework, the TETchain protocol gains the ability to ensure trustless delivery of messages between disparate chains.	LAYER 2
Polygon	**Polygon**	Formerly Matic Network, is a Layer 2 network that addresses the throughput and sovereignty challenges of Ethereum.	Since Polygon is ETH-based, it shall offer the same benefits against ETH wherein we have lower gas fees and better throughout.	LAYER 2

CONCLUSION

We presented a reformulation of cryptographically secure consensus into modern blockchain architecture that will allow mainstream applications to use blockchain technology. Our approach applied the dimensionality reduction technique of locality-sensitive hashing allowing for a trust chain at an internet-scale. In addition, we provide a distributed architecture between distributed applications and the community.

A blockchain is more than the sum of its protocols, source code, and utility. It is ultimately a social system that inspires, enables, and connects people and data. Frustrated by half-measures, failures, and broken promises of past protocols, we set out to build something better.

This process is not simple nor have we ever believed it can finish. Social and community protocols continue to change as people and societies change. To be relevant, we want to tap the power of evolution and bring it to the Tetrix Network.

Evolution is not guided by a single hand or a grand design. It is a process of inspired endless mistakes and problems. The Tetrix Network seeks to be the digital embodiment of this process able to survive the markets of today and adaptive enough to evolve the needs of the future.

As we move from research and development to a deployed system, there will be growing pains, but we hope that Tetrix's future could be a part of our everyday lives. We cannot know the future, but we are glad to be trying to make it a better one for everyone.

“Look around you. Everything changes. Everything on this earth is in a continuous state of evolving, refining, improving, adapting, enhancing...changing. You were not put on this earth to remain stagnant.”

— Steve Maraboli