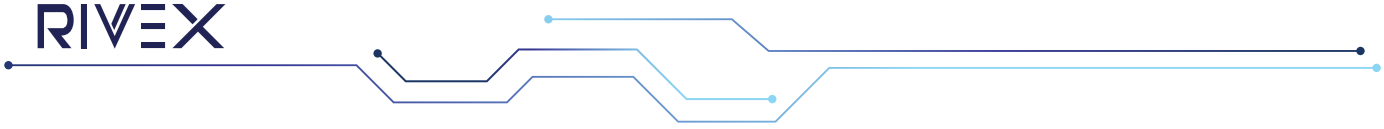
RIVEX

AN INTEROPERABLE AND SCALABLE LAYER-2 SOLUTION

Abstract

Blockchain technology refers to elements that allow for the secure transfer of value using private and public key models as well as consensus mechanisms that rely on cryptography. Transparency and trustless nature are some of the major elements in blockchain distributed ledger technology. The first implementation of blockchain distributed ledger technology is the Bitcoin network which is based on Proof of Work methodology. Subsequently more projects were introduced into the space bringing along their own unique decentralized consensus mechanisms like Proof of Stake, another major consensus mechanism widely adopted. The network is maintained using this technology via the use of decentralized consensus mechanisms which also means that it is not controlled by a centralized authority. The larger the network and decentralized growth, the more secure this technology is. However, the smart contract has made a notable impact. It is one of the most used applications that reside on blockchain technology specifically on the Ethereum Blockchain. A smart contract is a self-executable contract on a decentralized blockchain ledger. It is a collection of code and data that present at a specific address on the Blockchain. As smart contracts on the Ethereum blockchain offer features that allow more customization during creation, many ideas were spun out which later evolved into projects undergoing fund raising and subsequently raising the value of Bitcoin and Ethereum. This is how the masses got to know about Blockchain technology and now everyone is keeping an eye on how blockchain distributed ledger technology can revolutionize how organizations execute their business transactions.



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01 Friction

Blockchain distributed ledger is a type of database that is shared, replicated and synchronized across all members of the decentralized network. Transactions like the exchange of data or assets by users of the network are all recorded on the ledger. Records which are updated on the ledger are agreed upon using consensus mechanisms by members of a network. This also means that the network is governed by all members and no central or third-party authority is involved. Every record in a blockchain distributed ledger has a timestamp and unique cryptographic signature enabling the ledger to be auditable. This also means that the historical transaction in the network is immutable.

The current world is all connected and integrated which means business activity takes place in business networks that span across national, geographic and jurisdictional boundaries. One can compare a business ledger to how a blockchain distributed ledger can be utilized. Let's picture the consistency in business ledgers. Often you can say business activity occurs at a marketplace where the members such as suppliers, producers or any stakeholders exercise their rights and entitlement on assets which are items with value tied to them. These assets can be tangible or intangible like homes which are a physical product or virtual product like stock certificates. The transaction that produces value on this business network occurs when the assets ownership is transferred. These transactions usually involve various individuals like buyers, sellers and intermediaries where all the agreements and contracts are recorded in a ledger. Businesses use multiple ledgers to keep track of things, more so on those that have multiple lines of business. These ledgers are simply a system that have all business activities recorded. Looking at the description above, we can see that business ledger used currently is not effective. Aside from being inefficient and costly, they are also subject to being misused. The probability of disputes caused by lack of transparency increases which could possibly raise the cost tremendously as reversing transactions and providing insurance is expensive and inefficient. The tendency for corruption and fraud is also higher which can lead to missed opportunities. There are also times where certain ledgers are not updated causing delayed actions or worse, business decisions made based on old data.

All the mentioned issues from the current business ledger can be eliminated if not all improved by using a blockchain based distributed business ledger. An example of this is where different business segments store or maintain their own business ledgers. The duplication of this could cause discrepancies which will result in a scenario where disputes happen requiring a much longer time for settlement and cost associated in resolving these disputes. By using blockchain based ledgers, this risk can be eliminated as those transactions once written and validated, cannot be altered which greatly reduces cost due to the risk and time saving. Blockchain consensus mechanisms also produce consistent datasets which will greatly reduce errors and also allows members to alter certain data elements when a consensus is reached. From a security perspective, blockchain technology also increases trust and integrity as the origin of the source pertaining to the information on the ledger is not owned by one of the participants of the network. By being immutable, businesses also benefit from the lowered cost of audits and improved transparency from a compliance perspective. Being

immutable also means that activity executed on blockchain based business network is automated and final which leads to faster execution and reduced risk enabling a better revenue stream model for clients' interaction.

Ever since the 1960s, the global economy has been in the process of digitization. We often see how digital technologies are being used to improve business processes by enabling delivering of results in a safe and fast manner. With blockchain technology comes an improved version of digital technology where one can use it as an exchange of value. With the ongoing optimization and evolution of Blockchain technology, enterprise grade blockchain technology features key characteristics like a shared, permissioned ledger visible to all authenticated members and consensus protocols agreed by participants on the business network. Besides that, there is also the use of cryptography elements and Hyperledger Fabric like chaincode to maintain the integrity of the transaction.

With that being said, there are many challenges ahead that can recognize blockchain's disruptive value before mass adoption. Issues in areas related to legality, technology and cooperation will need to be solved as well. In terms of compliance, governments will develop new regulation in time which is causing blockchain based businesses to progress slowly due to compliance factors. When we mention compliance, one could be compliant the one day, and be noncompliant the next. There is no regulation that defines the standardisation to follow which limits the technologies ability to scale. The major technological factors also require mass cooperation from different businesses to create the required network effect. In the business world of today, competition tends to have a higher ratio which could lead to slow adoption from this frontier. However, looking at how the world's economy is changing, businesses that align with the flow of innovation are moving towards the path of building a reputable solution while saving costs at the same time. Blockchain technologies represent a fundamentally new way on how business is transacted. Blockchain together with the use of smart contracts and digital assets will enable a much safer, faster, efficient and scalable solution. Together with the inclusion of more participants will drive the path toward a more decentralized manner. Blockchain technology can also deeply change the way we organize and define economic activities.

02 Entering RiveX

RiveX has chosen Wanchain as the main platform to showcase its scalability, enterprise solutions and decentralized finance use cases. RiveX network has its very own dedicated features which leverage Wanchain's interoperability and capabilities. Interoperable and scalable decentralized applications, enterprise solutions and decentralized finance solutions can be built on RiveX benefiting from Wanchain's cross-chain mechanism bringing out the interoperable functions and capability for data to be transacted on-chain and off-chain while having the transaction hash recorded on-chain.

RiveX intends to provide developers, enterprises and applications with the ease of integration into the RiveX ecosystem via its robust SDK and API library. Developers or enterprises are able to design and develop or migrate their own solutions to RiveX's ecosystem with ease. Dapps built on other protocols have the option to leverage RiveX network or simply migrate over to RiveX with the advantages of the features provided. In today's modernized world where technology is disrupting and changing so rapidly, having a good user interface and experience is the key differentiator to attract someone to build or use your product. At RiveX, we are very particular on this not only for the end-users, but also to attract developers, enterprises and applications to join our ecosystem. The benefit of building on top of RiveX is further strengthened by the ability for end-users or programming interfaces to connect to the RiveX backend infrastructure.

Decentralized Apps are making huge progress but the current blockchain ecosystem is not prepared to scale as per the demand. The issues of slow block confirmations and high gas fees need to be solved before we target mass adoption by mainstream users. Most importantly, it needs great user experience.

We aim to change that by simplifying the interaction between users and the decentralized world. We want to make interacting with the decentralized ecosystem so easy that anyone can do so without worrying about the complexity of the system.

2.1 Why RiveX?

Enterprise solutions and traditional applications are facing challenges integrating into the blockchain ecosystem at an efficient and effective pace.

The issues of the lack seamless integrations of traditional enterprises solutions and applications are mainly due to issues like interoperability, privacy, transaction speed, usability, block confirmations and transaction cost. These issues have to be solved before they are able to migrate or integrate into the blockchain ecosystem.

Here at RiveX, we are focusing on combining a layer 2 solution and infrastructure layer to ease the integration between traditional users and the decentralized ecosystem.

2.2 Layer-2 - Technological Overview

Layer-2 is used for all blockchain scalability solutions which are built on a layer below the blockchain's main net, thus the name. The general idea is to move the transactional load, or at least part of it, off the blockchain network. RiveX's layer-2 solution focuses on private chain as its off-chain computation.

Enterprise solutions and applications will be built on this layer. They are able to choose their very own consensus mechanism and settlements can be done at lightning speed on this layer. Not only that, verifications can also be done on this layer if the applications or enterprises decide to make it fully private. If they do not wish to do so, they are able to perform their verifications on-chain or better known as layer-1.

RiveX's layer-2 solution connects the backend infrastructure to applications or enterprises which can be used by end-users or programming interfaces for developers to build applications on top of RiveX. RiveX has a dedicated and robust SDK library to ease the integration and migration of these applications.

2.3 Why Layer 2?

A. Scalability

Layer-2 solutions are built on top of an already existing blockchain and are a great option for scalability.Through the use of layer-2 solutions, very high throughput can be achieved without compromising security as they are built on an already secure base layer blockchain. As layer-2 solutions don't alter the base layer, the second layer can extend the benefits of public blockchains all while staying fully secure. Any application using a layer-2 solution can take full advantage of a secure base layer, with the higher throughput of the second layer.

B. Interoperability

Decentralization and interoperability go hand in hand as cross-chain communication needs to happen without the need of centralized networks. With interoperability, information can be shared across blockchains. A decentralized blockchain network is the ideal environment for blockchain interoperability to take place as sharing information from one blockchain to another needs to happen seamlessly without the need of any centralized intermediaries. There are several ways in which RiveX aims to set the interoperability standard and integrate these concepts into the current system. Strong and secure interoperable blockchain networks will allow users to take full advantage of multiple consensus mechanisms, allowing each blockchain to operate at its full potential while different tasks can be assigned to the chains most suitable. Interoperability allows for a more useful and user friendly environment while allowing blockchains to operate more efficiently.

C. Transaction Speed

For a transaction to take place, all nodes across a decentralized network have to reach consensus. Each node holds a copy of the past transactions in order to validate new transactions on the network. This prevents double spending as all transactions can be cross checked across the network. Existing blockchain networks exist as the base layer of the decentralized ecosystem. Layer-2 solutions allow for blockchains to operate more efficiently since computations happen off-chain. The biggest advantage of an off-chain solution is that it reduces the amount of data that needs to be stored on the base layer which frees up resources to perform other tasks without compromising security.

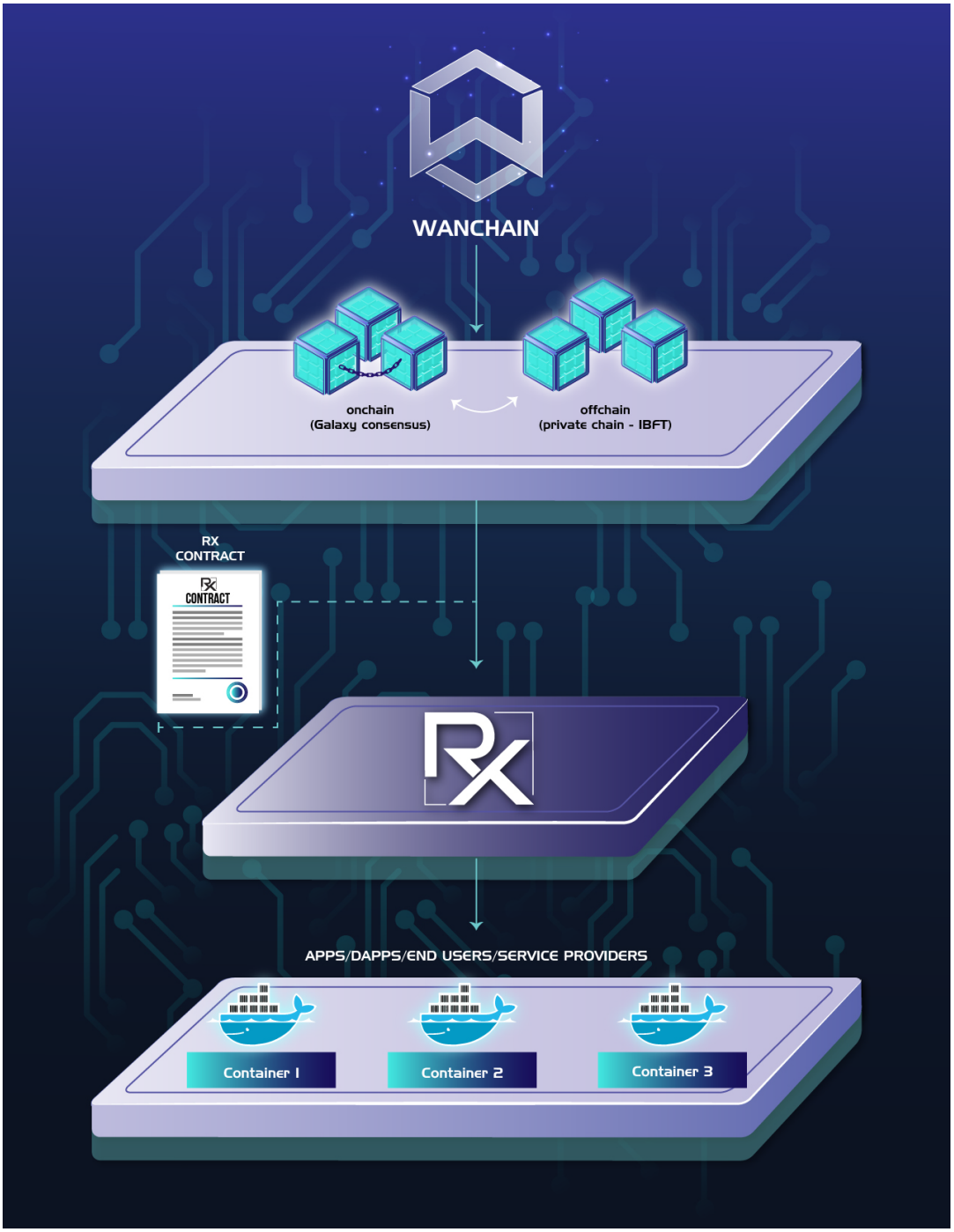
D. Transaction Cost

Transactions done off-chain don't usually have transaction fees as nothing actually occurs on the blockchain. Off-chain transactions don't require validation which makes it a great option when a large number of transactions are involved. On-chain transactions require validation and therefore could come at a high cost.

E. Block Confirmations

Layer-2 speeds up the confirmation of digital assets transfers as senders do not need to wait for the bloated block confirmations like what we are facing on the Bitcoin or Ethereum network. These transfers or payments can be done at an instant with confirmation accessed on a layer-2 network where it can digest up to thousands of transactions per second.

2.4 RiveX Overview



2.5 RiveX Architecture

RiveX's main ideology is for developers to build their solution or decentralized applications on our platform. In order to attract developers, we need to ensure our platform is feature rich so developers can leverage and benefit from the platform. Two of the features that will be inherited which we believe are attractive include the cross-chain mechanism and privacy option. We continue by diving deeper into how both these features work and how will the RiveX solution leverages on these features to provide innovative solutions.

The Wanchain cross-chain mechanism serves as a bridge between different blockchains. One major design factor of this mechanism is to ensure the total number of tokens on each blockchain remains static while they are transferred from one chain to another. The technology behind this utilizes secure multi-party computation secured by a certain secret key threshold during the cross-chain transaction process. This innovative method is deployed to Storeman nodes in the Wanchain ecosystem. A new methodology will be employed moving forward once the research and development is complete to create a more decentralized feel to this feature however as of now we will stick to the current design and upgrade or update where necessary. The next major design factor will be ensuring the transactions on the original blockchain are verified in a trustless manner. As of now, Wanchain is utilizing the atomic swap method involving the current Storeman node group as this prevents the need of cross-chain verification however this method will also be replaced or optimized in future.

The Wanchain privacy features apply the same privacy algorithm powering some of the main privacy coins like Monero, which is based off ring signatures. This is an essential function for many business fields thus why we consider this a major reason why we chose to build on the Wanchain blockchain.
As explained earlier, RiveX exists to enable applications or solutions to scale what public blockchains are lacking while maintaining the core element of decentralization which is immutable for transaction security. In order to achieve mass adoption, issues like network congestion or high gas fee will need to be eliminated and therefore RiveX exists to tackle this barrier

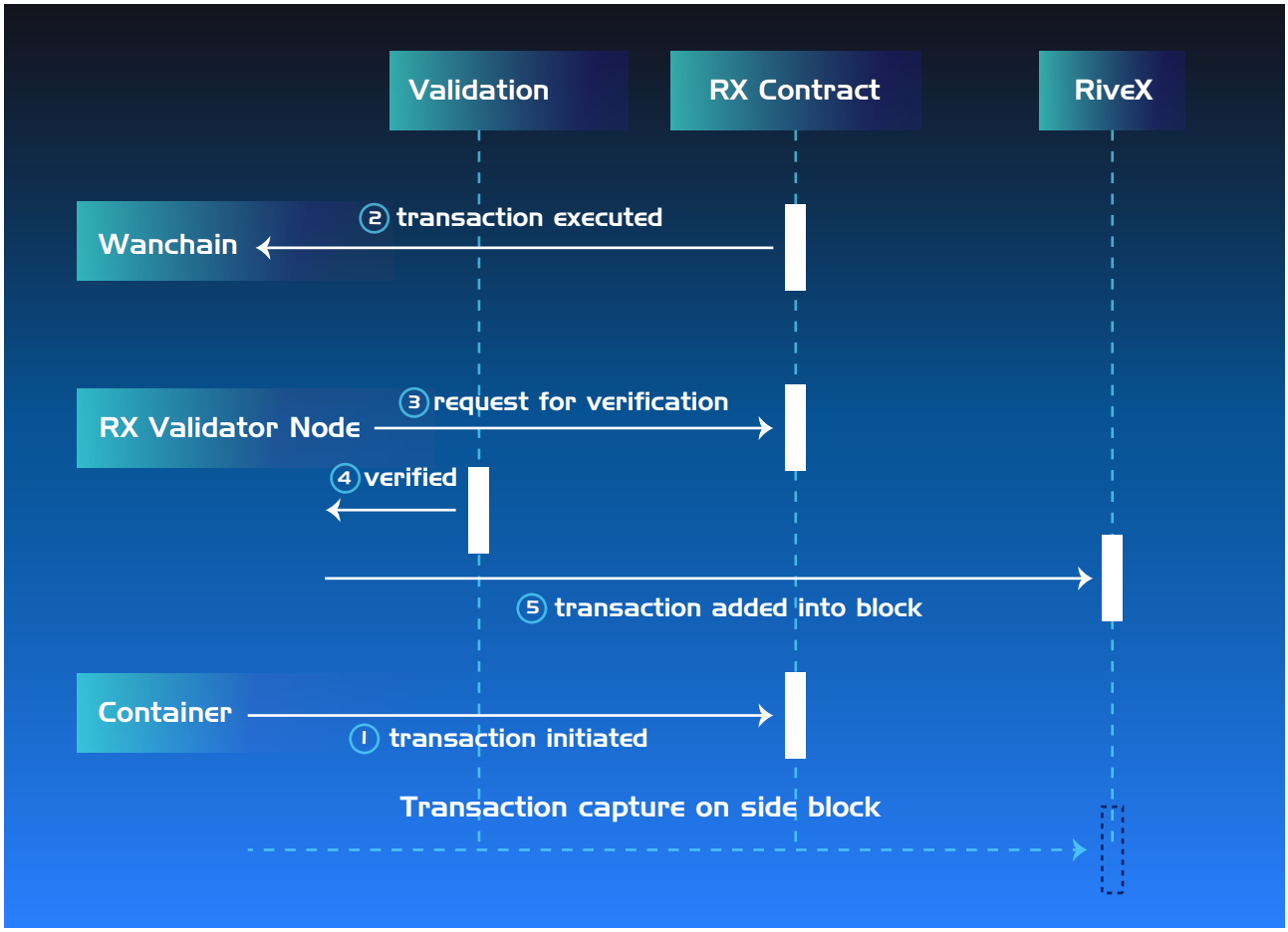
Below will outline how RiveX will function.

1) Applications, decentralized applications or solutions are built on RiveX via tools provided and structured into containerized package.

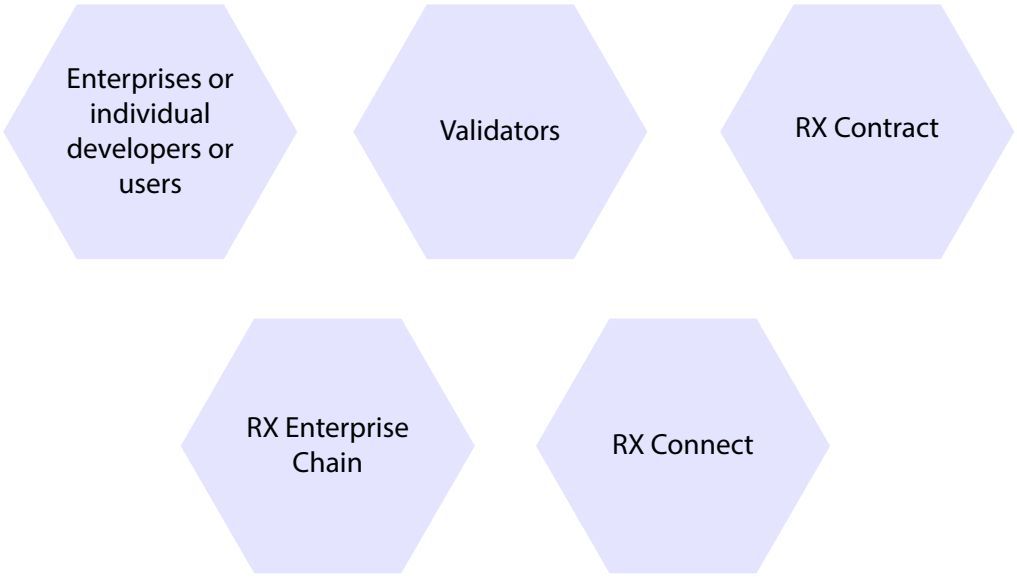
2) For applications or solutions that requires a digital asset or token, they are created on the root blockchain, Wanchain and exist as a WRC-20 token.

3) Any form of token transfer happens on the public blockchain and the transaction is verified by the RiveX validator node via the use of RiveX Contract deployment on the public blockchain.

4) The container can exist publicly on the RiveX chain or as an enterprise chain where this container is bundled together with private node deployment.



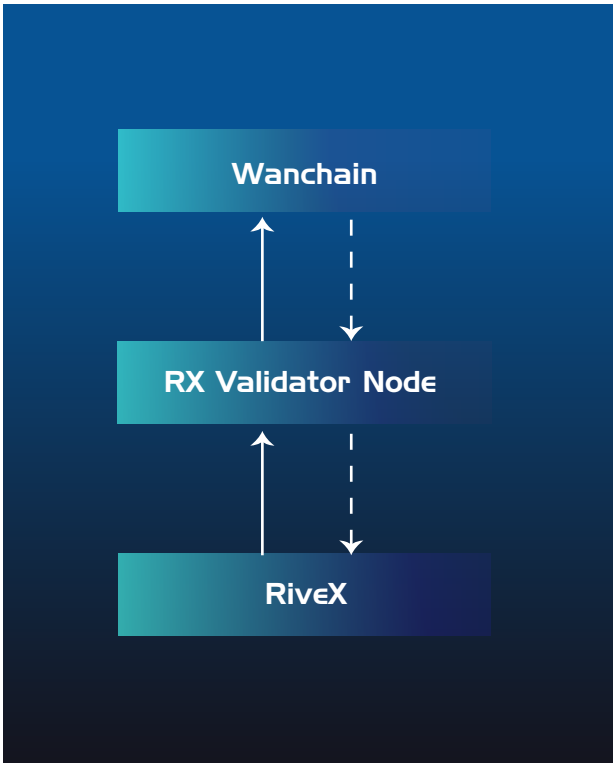
2.5 Rivex Participant and Stack



2.6 RX Validator Node

The RX validator node will adopt the Proof of Stake mechanism. As described above, the RX validator node performs a very critical function on RiveX. Any form of transaction performed on RiveX will need to be verified by Validators on the RiveX network and ensure that the transaction is recorded on the public blockchain. We will look into how this structure works. Moving forward we will categorize all applications or solutions as a container. When a container executes a transaction, either one that requires a move in token form or not, this transaction exists on the public blockchain. The container will first send the request and the transaction will be recorded on a side block. Bear in mind this is not the actual block that will occur on the RiveX chain. This then triggers the token to move on the public blockchain or transactions recorded on the public blockchain via the rules set by deploying the RX Contract on the public blockchain. We will look at what a RX Contract is in the next section. This action is unique on both the layers where container activity can still proceed even when transaction on the public chain has not completed. Validators will verify and provide their signature once the transaction on the public blockchain is complete and this transaction will then be recorded on the block. This is also being performed via the use of a RX Contract. Every validator will take turns in becoming the proposers here. A duration will be setup for other validators to challenge if they detect foul play. Once the duration is over and two thirds of the signature is obtained, the transaction will be added to the RiveX block and the process will continue.

This mechanism enables the RiveX network to achieve high throughput while not sacrificing the core of decentralization. Containers are able to perform their activity without subsiding to issues occurring on the public blockchain while taking advantage of the immutable and transparency element of blockchain technology which will greatly improve security and trust in a business environment.

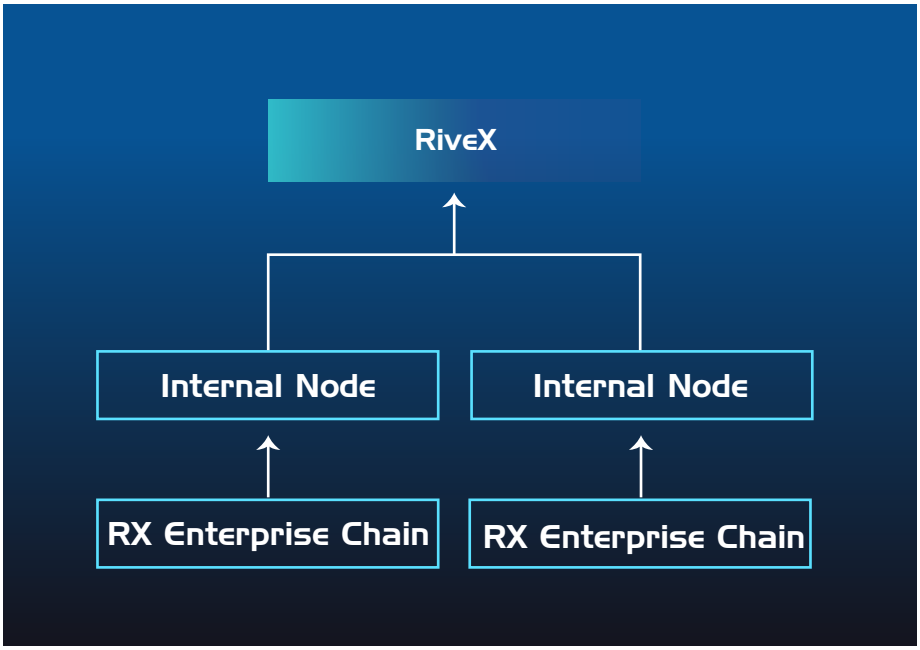


2.7 RX Contract

A RX Contract has a unique set of rules defined to enable the movement of a token or transaction recorded on public blockchain. A RX Contract template will be created that works with most use cases or the option to customize the contract use when a container is deployed on the RiveX network. These contracts will then be deployed on the public blockchain. The container will then interact with this contract whenever there is a request from the business or activity perspective. This will then trigger the respective contract and execute on the public blockchain. RX Validator Nodes will also be calling RX Contracts deploy on public blockchains to perform required validation or verification. Exact smart contract code will be defined in the technical paper once it is fully developed outlining how it works from a technical perspective.

2.8 RX Enterprise Chain

RiveX encourages the provisioning of RX Enterprise Chains on the RiveX network. One can compare RX Enterprise Chains to a side chain work however RX Enterprise Chains exists solely on the RiveX network. Private validation nodes will be deployed internally and transactions verified by these nodes will only then be processed by the structure we defined above. These chains can be either permissioned or permissionless depending on the container or use case design. Via the use of RX Enterprise Chains, we believe it will be easier for mass adoption as there are certain business niches where privacy is a must, for example the financial sector. Via the use of RX Enterprise Chains, a solution can be designed to enable two different entities to perform verification i.e. in a supply chain management sector where purchase requests and purchase orders take place. The idea behind the provisioning an RX Enterprise Chain is to enable solution customization when building on RiveX.



2.9 RX Connect

RX Connect is a platform that will feature tools and a graphical interface that can be utilized by anyone to start exploring development of their idea on RiveX. The common RX Contract template will also be deployed here for ease of use by users that do not have suitable programming knowledge. Besides that, the knowledge base section will also feature all SDK libraries, an API gateway and functions as well as containerized command use to deploy applications or solutions on the RiveX network. A RX sandbox will also be provided for those who want to test out building on the RiveX platform where the deployment of apps or solutions will be connected to backend infrastructure and relevant access.

2.10 Upcoming Plan

We plan for the RX Contract to be deployable on other public blockchains directly. This can be a collaboration effort with Wanchain as well. As for other public blockchains that Wanchain has not yet cross-chained with or does not make use of smart contracts, we will be utilizing a simple operator model to enable the interoperability features. This will include deploying the same number of equivalent WRC-20 tokens on Wanchain after those tokens are sent to the operator maintain by those solutions.

There will also be a plan to provision RX WebAssembly to enable quicker execution of the RX Contract. Besides that, it opens the doors to more participants as it enables builders on more programming stacks to be able to utilize these features to migrate or develop their solution on.

During development we will also look into planning to resolve congestion on the RiveX network as a result of spam or a DDoS attacked. This is particularly critical if we want mass adoption as a platform that is prone to frequent congestion deters users.

2.11 Rivex Enterprise Solutions and Use Cases

A. Loyalty Points

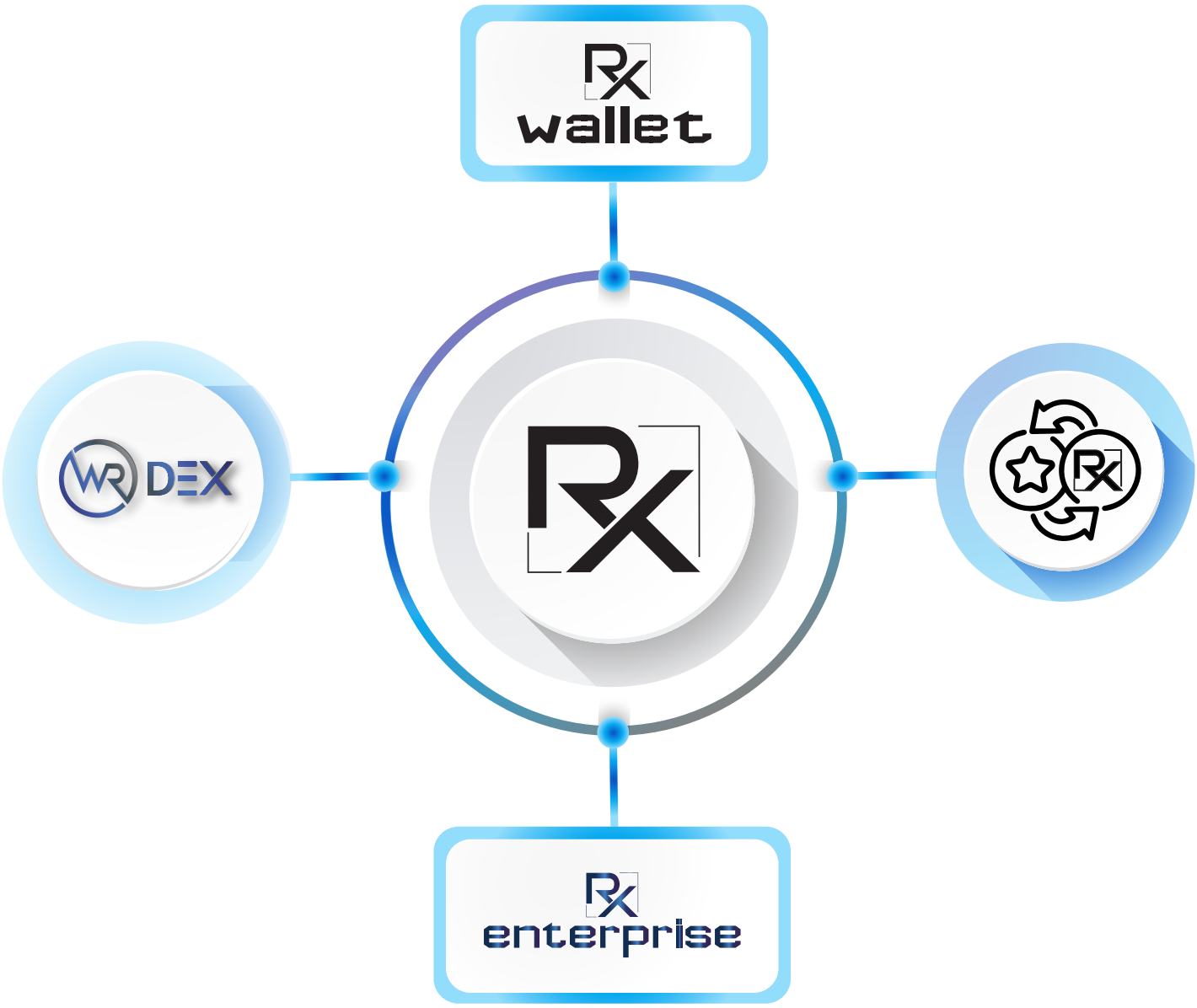
A cross-chain interactive decentralized access model in the context of loyalty points and token assets transfer management by providing a feasible solution for users to optimize device management and convert their loyalty points and token assets to cash flow. In addition to that, a design for an access control protocol for loyalty points and token assets in the interaction between private chains and the consortium blockchains. A prototype of our model and evaluation of its performance has been achieved with extensive experiments. The results demonstrate the effectiveness and efficiency of our model.

B. Decentralized Exchange

The world's first cross-chain decentralized exchange. The DEX is backed by Wanchain's storeman nodes for a fully functional decentralized feature. Wanchain's approach to a cross-chain DEX is different from current cross-chain DEXes in one key way. Whereas the current approach to trading foreign chain's tokens on a native chain relies on trusted third parties to wrap tokens, Wanchain's approach is built on top of its decentralized cross-chain storeman mechanism. Through this mechanism, a token is locked in an account on its native chain (Bitcoin, for example) which is managed by a distributed group of storeman nodes rather than any individual trusted organization or company. A WRC20 wrapped token is then released on Wanchain (Wanchain's WBTC, for example), which is then available for trading. The DEX will have more features such as decentralized leverage trading and decentralized borrowing/lending in the future.

C. Blockchain Name Service

Blockchain-based domain name service. xBNS enables engagement between IPFS hashes, smart contracts and wallet addresses. For an example, a sender (Alice) may send emails or any tokens that Wanchain has cross-chained with to the receiver (Bob) by inputting his BNS such as BOB.RVX instead of the usual public addresses.


wallet
DEX
enterprise

03 Blockchain

3.1 Wanchain Private Chain

RiveX will be building on Wanchain's own private chain model known as Lanchain. Wanchain is positioning themselves as the gateway to how different blockchain can communicate with each other. From a financial standpoint, Wanchain is branding themselves as the infrastructure connecting the decentralized financial world. Although blockchain technology is rapidly shaping the digital world, as everyone knows, there is still a persistent core issue with blockchain technology where each blockchain network is operated in an isolated territory whereby only the dedicated digital currency will be able to transfer within the same network. Wanchain is playing an active role bridging the gap between these networks and ensuring open finance will be realized via the interoperability model.

As Wanchain is focusing on the financial niche, RiveX being an infrastructure centric project will be able to enhance the utility of Wanchain. Data and report are the crucial elements in the world of finance. While Wanchain is assisting with the transfer of each digital currency, RiveX will provide a layer whereby actual human readable data will be produced right in front of them. This could be from simply performing transactions, to the analysis of spending habits by a particular entity.

3.2 Advantages of Private Chain

Performance guaranteed and privacy protection via one-time account and ring signature systems.

Rapid development for servers, mobile devices and personal computer via Lanchain standard SDK and API enable simple usability

Easy and rapid deployment model as node can be deployed via the use of Docker's latest technology. Paring with the standardised deployment process enable quick and simple smart contract functionality deployment.

The innovative of cross-chain protocol enable the formation of industry grade chain with the capability of interaction with other chain.

Lanchain inherits the framework and features from the Wanchain Blockchain. Lanchain is developed to be an Industry Grade Blockchain Solution as it features comprehensive development tools like SDK that supports multi-platform and an SDK Toolkit that enables customization. Lanchain is using IBFT or Istanbul Byzantine Fault Tolerance consensus mechanism. IBFT is an alternative consensus mechanism to the POW Ethereum network consensus. It works similar to other algorithms whereby the mechanism still ensures a single, agreed-upon ordering for transactions on the blockchain while giving additional benefits for enterprises like settlement finality. Reasons on why Lanchain is using the IBFT consensus mechanism is because this model is very appealing to private blockchains especially when consortium is involved as well.

3.3 Interoperability

The cross-chain protocol ensures interoperability between blockchains, thus enabling the exchange of value as well as data between various networks. With the added benefits of public decentralized chains, these protocols should lay the foundation for blockchain mass adoption and use.

Cross-blockchain compatibility allows different blockchains to communicate with one another without the help of centralized intermediaries. What this means is that blockchains sharing similar networks will be able to transfer value and data between each other.

3.4 The benefit of IBFT:

- Immediate block finality
- Reduced time between blocks
- High data integrity and fault tolerance
- Operational Flexibility

Lanchains can be implemented as either a permissioned or permissionless chain.

Lanchains can be tailor made for different purposes.

- Querying of data
- Frameworks
- Writing
- Smart Contract Templates

04 Consensus Model

4.1 RiveX Consensus Mechanism

As everyone knows, blockchain is a decentralized peer-to-peer system with no central authority figure thus it creates a system that eliminates failure due to corruption from a single source. However, this creates a major issue whereby one would ask how decisions get made and how anything gets done. A centralized entity has a board of leaders to make critical decisions however on blockchain it is not possible as there in no leader. A decision being made on blockchain requires consensus to reached via a consensus mechanism. Consensus is a dynamic way of reaching a decision that benefits the group as a whole. There are various consensus mechanisms like Proof of Work, Proof of Stake and Proof of Authority to name a few.

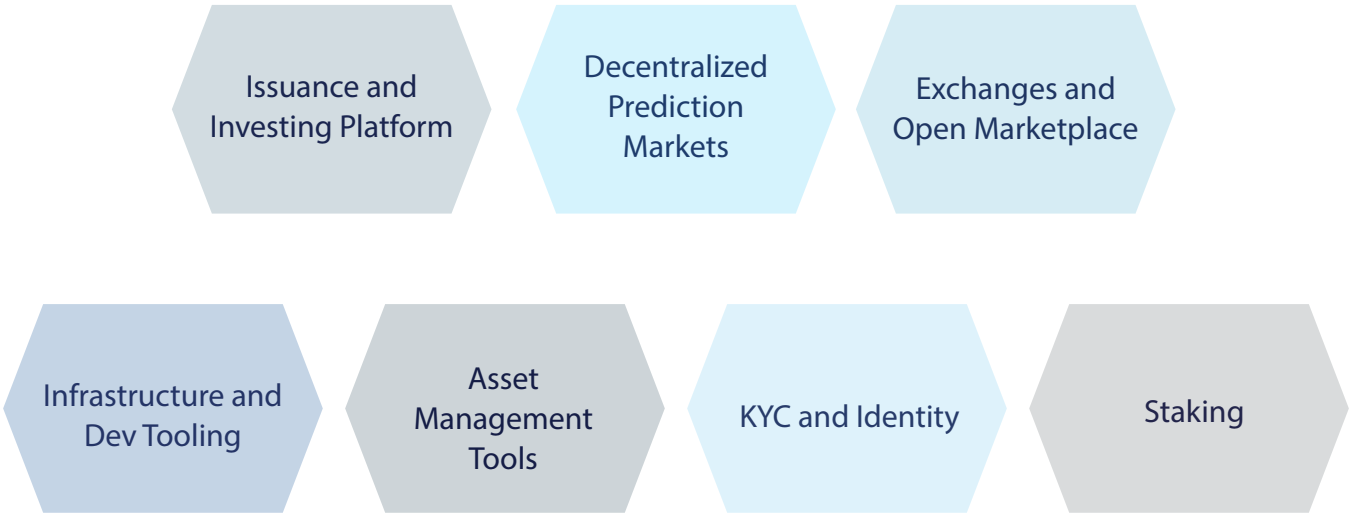
RiveX will be using Proof of Stake consensus mechanisms to help secure and stabilize our core RiveX network.

The algorithm deploy within a Proof of Stake consensus mechanism is base off creator of the next block is chosen by different combination of random selection or wealth and age. There has been a debate that algorithm base solely on wealth will cause the network to be centralize as a single wealthy person or entity can accumulate the required token and place it for staking influencing the whole network decision. Thus we see project uses randomized block selection or algorithm that combine coin age as a factor as well during design. Besides that, those token are own solely by the validators of the network and this create a sense of responsibility as a portion of respective token is stake to perform the work required and in return you are getting back rewards in the same form of token. This will create an effect where validators will not be performing any action that could jeopardize the network.

This consensus mechanism also allow the deployment of lending or borrowing of staking power of validator nodes. The term here is delegation where delegators can benefit from staking as well while not required to maintain a node or performing any periodic action required. This will also bring certain benefit to validators as well depending on the design of the Proof of Stake network for that particular network. Proof of Stake is generally more environment friendly as it does not require a huge amounts of energy to perform validation.

05 RiveX Pillar

RiveX will comprise of two major pillars, one being Blockchain as a Service (BaaS model) and the other being the DeFi pillar. Under the BaaS pillar, we envision adoption via our Enterprise Dapp, Erox, where consumers or users will benefit from performing their everyday tasks via an all in one solution. Under the DeFi platform, we envision service or platform providers utilizing our solution to scale their own products further and faster. Besides that, we also hope that more developers or businesses will be using our tools or platform to start deploying their solutions. Some of the areas where solutions or tools that can be built are listed below.



06 RiveX Token

RiveX token will be developed based on WRC-20. Rivex Token will be denominated with RVX as the ticker. Like the majority of the ecosystem, RVX token is the native token of Rivex Ecosystem. RVX Token will be used for enterprise solution services, DeFi product initiator and rewards for the participants which contribute defined value to the ecosystem.

On the enterprise solution services end, features that require transactional purposes will consume gas and the medium use will be RVX token. Certain development works will also require a fixed amount of RVX token to be used where these tokens will flow back into the River Foundation or ecosystem fund wallet thus with more partnerships and more apps being built on the Rivex ecosystem, the circulating supply of RVX token will be greatly reduced. Under the DeFi pillar, RVX Token will be used as the primary medium for participation in any assets being rolled out.

RVX Token is also used to serve as a rewards medium for validation. A thorough validator node model and fair economic model will be produced which will not only cover participant's hardware and maintenance cost but ensure that participants will be rewarded generously based on contribution and work done.

6.1 Tokenomics

ELEMENTS	RVX TOKENS	WEIGHTAGE
Private Sales	150,000,000	3.75%
DeFi Initiatives	1,600,000,000	40%
Ecosystem Fund	1,700,000,000	42.5%
Team	200,000,000	5%
Foundation	100,000,000	2.5%
Partners	250,000,000	6.25%
Total Supply	4,000,000,000	100%