



RioDeFi

THE NEXT FRONTIER OF FINANCE

Whitepaper - August 2020

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Introduction

Who We Are

Rio DeFi is a Blockchain technology company.

Our mission is to accelerate the mass adoption of digital assets by bridging traditional and decentralized finance.

We develop solutions that connect businesses, financial Institutions, and banks with distributed ledger systems. Our core technology is a next generation Blockchain infrastructure called Rio Chain.

Applications built on Rio Chain enable lower transaction fees, faster confirmations, more efficiency, and global reach.

Rio DeFi, the next frontier of finance.



What is DeFi?

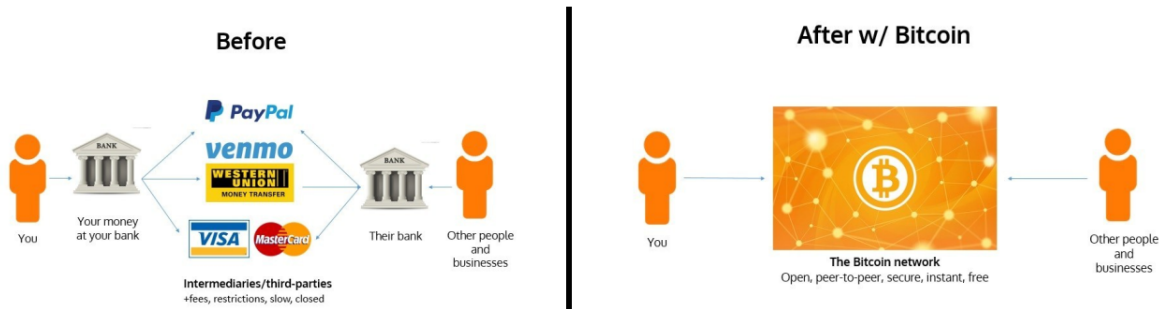
DeFi stands for Decentralized Finance. It enables a global, open alternative to every financial service you use today — savings, loans, trading, insurance and more — accessible to anyone in the world with a smartphone and internet connection.

The world's financial system needs upgrading. In an age of increasing globalization, money transfers still rely on outdated legacy systems. Payment solutions and financial services require numerous intermediaries and are often siloed. Most forms of currency are issued and controlled by centralized governments.

More than one third of the world's population is still unbanked and as such cannot partake in the global economy. Every year, migrant workers around the world spend over \$38 Billion on transaction fees and currency conversion fees to send payments back to their families; total fees average around 7% of the payment amount. These high fees have a large impact on poverty and growth rates in developing countries.

Bitcoin vs. Traditional Finance

Ten years ago Bitcoin emerged as an alternative global payment system. Its value proposition is fairly simple: instead of the traditional reliance on centralized banks and third-parties, Bitcoin provides a decentralized, open, and peer-to-peer payment system.



Since its creation in 2008, Bitcoin's evolution as an asset class has two distinct phases:

- 1) Discovery Phase - lasted until around 2014 with the emergence of more exchanges and custodians, which coincided with better security and liquidity
- 2) Structuring Phase - this current phase has ushered in a broad range of complementary technologies and services alongside Bitcoin's growing adoption

The Growth of Decentralized Finance (DeFi)

We foresee an emerging third phase, the Institutional Phase, where Bitcoin is increasingly held as an asset by financial institutions such as banks, hedge funds, pension funds, sovereign wealth funds, endowment funds, and others. Why would they hold Bitcoin? It's a hedging instrument against the risks inherent in centralized fiat currencies, debt instruments, and equities. This Institutional Phase should eventually see even governments' central banks use Bitcoin as a reserve asset alongside gold, fiat currencies, debt instruments, etc. The expansion of the Bitcoin ecosystem over time has translated into a tremendous increase in adoption and value. However, with ever-changing transaction fees, high volatility, long confirmation times, and a deflationary economic model, Bitcoin remains a better store of value than a currency for daily use.

At Rio DeFi, we believe that new technologies and financial instruments need to be created in order for digital assets to reach mass adoption. The number of cryptocurrency wallets across blockchains was around 44 million in December 2019. Based on a global population of 7.8 billion people, the current cryptocurrency market involves less than 1% of the global available market. Rio DeFi will help bring the other 99% of the world into cryptocurrencies by providing software solutions that are scalable, interoperable and upgradable. We're also partnering with trusted financial institutions to provide the traditional financial services that people have come to rely on: secure storage, audited processes, good customer service, and account recovery options.

Rio Chain

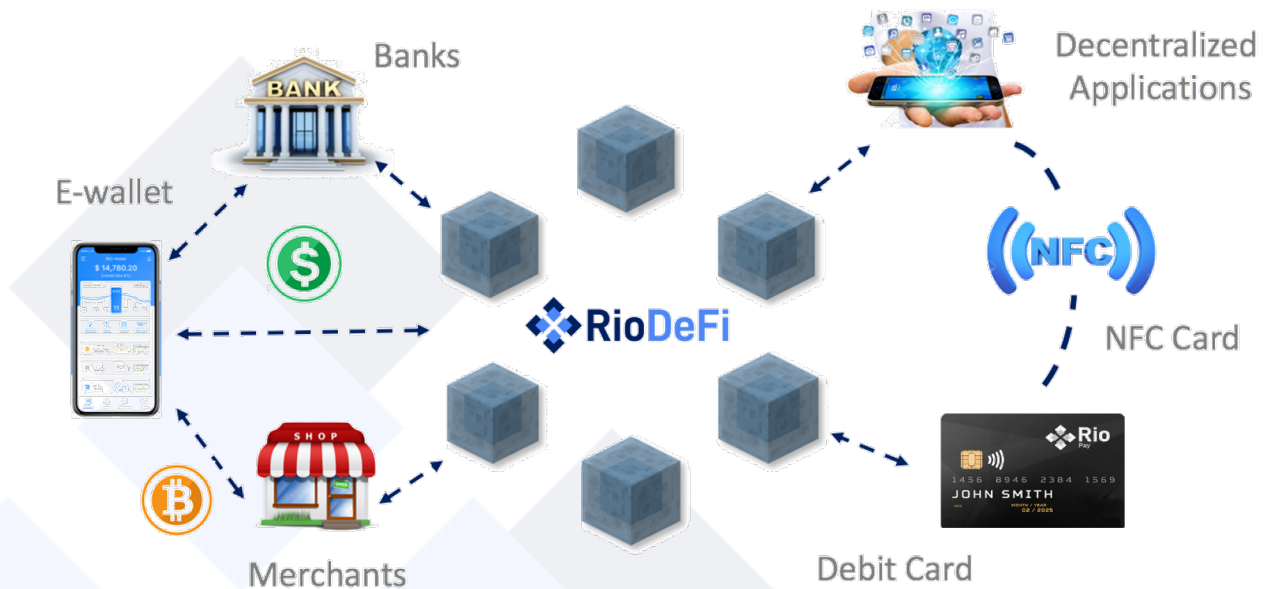
Introducing Rio Chain

Rio DeFi is creating technological infrastructure for a new decentralized financial system powered by blockchains and smart contracts. At the heart of this technology stack is Rio Chain, which supports an ecosystem of decentralized financial applications. It is an adaptive digital platform tailored for mass scale adoption.

The current limitations of distributed ledger technologies are well known: slow speeds, low transaction throughput, lack of user friendliness, and incompatibility with existing systems. These shortcomings are mostly the result of a misalignment between existing platforms' capabilities and traditional industries' requirements.

Advancing Adoption

Rio DeFi aims to bring blockchain technology to the masses by prioritizing adoption, performance, scalability, and ease of use.



Rio DeFi will launch with ready-made financial applications developed by our trusted partners. These applications are exclusively released on Rio Chain and benefit from the support of our partners and investors.

Philosophy

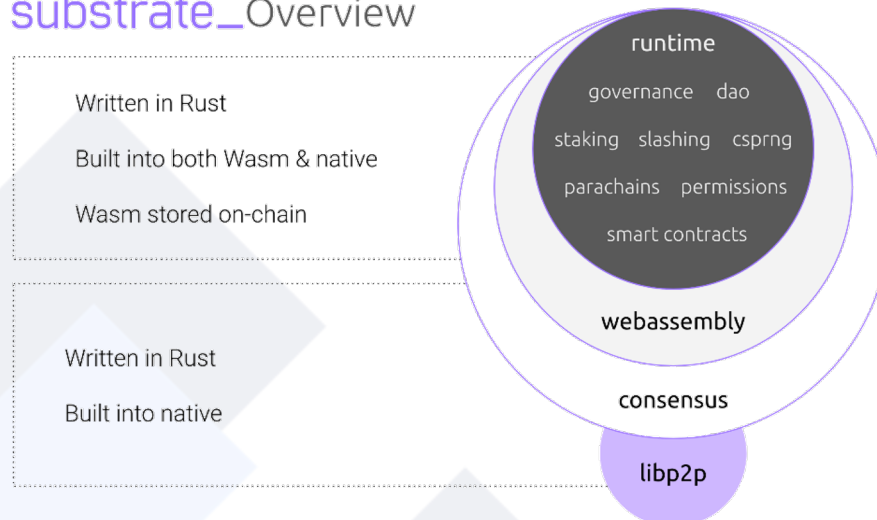
A Next Generation Platform Built with Substrate

Rio DeFi takes very much the opposite view to chain maximalism. We believe the idea that one blockchain should prevail, to the detriment of all others, is a hindrance to innovation in the space and negatively impacts the broader adoption of distributed ledger technologies.

On the other hand, we acknowledge that the coexistence of different blockchains requires developing mechanisms for those networks to interoperate. Over the past three years, inter-chain protocols that facilitate sharing of information and the execution of smart contracts across blockchains have emerged.

The blockchain industry is also in dire need of middleware, tools, and frameworks that developers can plug into easily to build blockchains and decentralized applications more efficiently. One notable initiative that addresses both issues is Parity's Substrate.

substrate_Overview



Source: https://wiki.web3.foundation/en/latest/tech_stack/Layer1/low_trust_interaction_protocols/substrate/

Substrate is a software development framework to build blockchain technologies. It can be used to create standalone blockchains or to build (native) parachains.

Since its release in 2018, Substrate has quickly become one of the most popular blockchain templates. It also became an obvious choice for our team when we decided to build Rio Chain in early 2019.

Technology

Blockchain for Business

Existing blockchains are too slow, too rigid, and too foreign to traditional digital infrastructure to be used by most organizations. Our core belief at Rio DeFi is that distributed software solutions must meet businesses requirements in order to be successful. Rio Chain's characteristics reflect this philosophy, especially with regard to scalability, interoperability, and upgradability.

Hybrid model

To ensure scalability, security, speed (2s/block), and transaction throughput (3000+ TPS), Rio Chain adopts a federated model.



Flexible Approach

- Virtual Machine Interpreter supports Web Assembly
- Light client requirements
- Customizable consensus algorithms



Interoperability

Rio infrastructure efficiently connects organizations (banks, merchants, dApps) with users across multiple blockchains.



1 / Usability
OAuth authentication
Integrated website



2 / Scalability
Federated system
Cross-chain protocol
Incentive mechanisms



3 / Security
Audited technology
Legal Compliance



Consensus Algorithm

The blockchain runtime is a state machine. It has some internal state and state transition functions that allow it to transition from the current state to the future state. In most runtimes, there are states with valid transitions to multiple future states, but a single transition must be selected. A blockchain must agree to:

1. The original state, called "genesis";
2. A series of state transitions, each called a "block";
3. Final (current) status.

At its current stage of development, Rio Chain uses Proof-of-Authority (PoA) for establishing consensus, adopting Substrate's Aura (Authority Round) + GRANDPA (GHOSH-based Recursive ANcestor Deriving Prefix Agreement) consensus algorithms. Aura is mainly in charge of handling block data, while GRANDPA is mainly used to verify the finality of the blockchain. Splitting the block data writing and finality verification processes in this way makes the whole network have a greater degree of flexibility. Finality brings greater certainty to online payments, which are the basis of financial services on the chain.

In its next stage of development, Rio Chain will switch from PoA to Proof-of-Stake (PoS). At this point, the consensus algorithm will be switched from Aura to BABE (Blind Assignment for Blockchain Extension) to better support the PoS requirements.

To agree on the resulting state after the transition, all operations in the blockchain's state transition function must be deterministic. Blockchains batch transactions into blocks and use methods to select which participants have the right to commit a block. Rio Chain selected the AURA consensus algorithm as the engine to produce the block and GRANDPA to validate and confirm the block.

AURA

Slot-based consistency algorithms must have a known set of validators that allow block generation. Time is divided into discrete slots in which only a few validators may produce a block. In AURA, a set of known blockchain nodes are authorized to represent authoritative validators, and blocks of the blockchain are generated by these authorized nodes.

GRANDPA

GRANDPA provides block termination. It has a known set of weighted authorities. Unlike other algorithms, it does not produce blocks. The validator votes on the chain instead of the block, that is, they vote on the block they think is "best," and their vote applies transiently to all previous blocks. Once more than two-thirds of the authority votes for a particular neighborhood, it is considered final.

Hybrid Federated Model

Rio Chain currently operates as a federated blockchain rather than a permissionless public blockchain. As noted above, we use a Proof-of-Authority consensus model. In the early phases of its development, the Rio network will only have a handful of nodes that are run by Rio DeFi and our founding partners.

Benefits of Federated Blockchains include faster speeds, scalability, low transaction costs, low energy consumption, strong security, and increased ability to provide data privacy features and work with regulated institutions. For Rio Chain, this translates into 2 second block times, up to 3,000 transactions per second, and no risk of 51% attacks.

There's a known issue with blockchains known as the blockchain trilemma. Currently, every node maintaining either the Bitcoin or Ethereum network is working on the same public ledger. Every node has to process every single transaction. Adding more computers into the network improves security, but it can actually decrease efficiency. So far, none of the blockchains have managed to achieve scalability, security, and decentralization at the same time. You generally have to pick 2 out of 3 to focus on. With Rio Chain, we've chosen to focus on security and scalability.

We plan to become more decentralized over time as blockchain technology improves to resolve this trilemma. There are some promising ideas out there, such as creating a secure, decentralized network utilizing a hybrid Proof-of-Stake & Proof-of-Authority (identity-based) model with light node validators. A network of identified validators with small token stakes, chosen at random each block, could potentially even use mobile phones to validate all transaction data, which could then be stored on more centralized nodes and decentralized file-sharing systems.

Rio Chain Format

Public-Private Key: Rio Chain mainly adopts "sr25519" and "ed25519" as a public-private key generation algorithm. General account adopts "sr25519" and Node account adopt "ed25519" for enhanced security and to remain compatible with the libp2p format.

Address Format: Rio Chain adopts "R" as a prefix for all wallet addresses and adopts "SS58" as the address format (modified from the base-58-check of Bitcoin). The basic format is as follows:

base58encode (concat (<address-type>, <address>, <checksum>))

"address-type" is the prefix, and it adopts following format:

- **Betanet and Mainnet networks:** "R" as prefix, the value of parameter "ss58format" is 240.
- **Test network:** "P" as prefix, the value of parameter "ss58format" is 221.

Checksum is a check code used to verify the correctness of an address.

Transaction Fees

Rio Chain receive transaction fees are divided into four types:

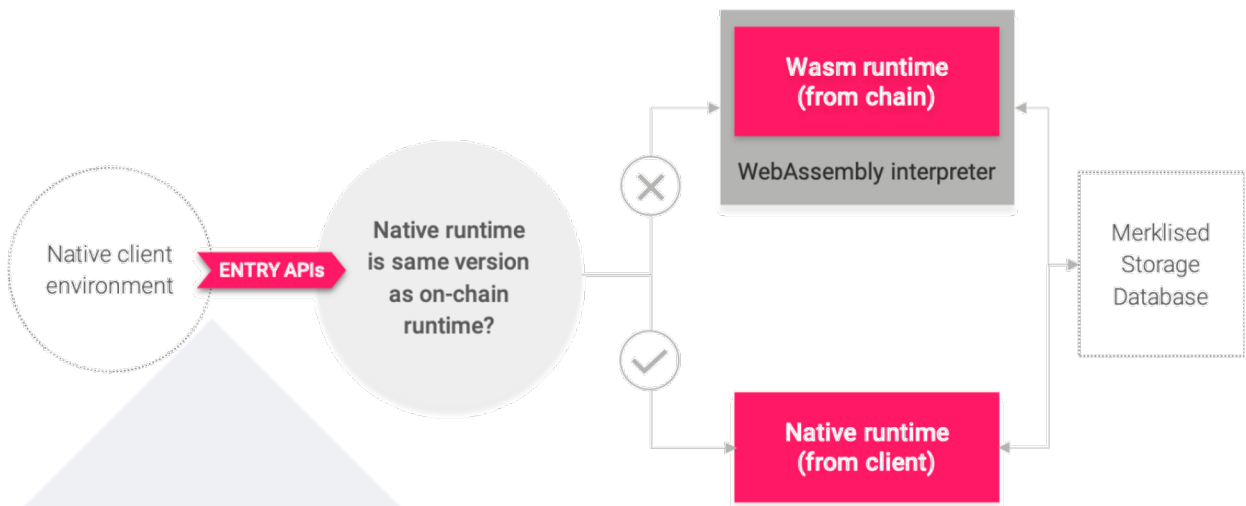
1. **Base Transaction Fee:** A fixed value is charged for each transaction.
2. **Byte Transaction Fee:** Charges are based on the size of each byte.
3. **Weight Fee:** Charge according to the specified transaction weight.
4. **Tips:** Users can pay tips to increase the priority when packaging a transaction.

At present, Rio Chain only employs the base transaction fee method, which is currently fixed at 0.1 Rio Fuel (RFUEL), regardless of the transaction type; however, its structure supports future adjustments along these four types. As more nodes are brought onto the network and different dApps place added resource constraints on the network, the node operators can vote on whether to enable the other transaction fee types.

Rio Core Runtime Module

Rio Chain and its nodes were developed based on the Rust programming language. Rust is intended to be a language for highly concurrent and highly safe systems, and programming in the large, that is, creating and maintaining boundaries that preserve large-system integrity. This has led to a feature set with an emphasis on safety, control of memory layout, and concurrency. Rio Chain takes advantage of Rust's rich features to perform some unique on-chain operations, such as on-chain upgrades.

All Rio Chain code will be compiled into two versions, native and Web Assembly (WASM). The chain's native version uses Rust, and the virtual machine version uses WASM. Even if there is no latest native version, the nodes can also run the latest WASM version until the binary code has been fully upgraded to the latest version, making seamless upgrades of the network possible.



Every time Substrate executes a block, it checks its version of the code, being able to switch from native runtime to the Wasm runtime on-chain in case the node is not running the most recent version.

Source: <https://www.parity.io/a-brief-summary-of-everything-substrate-polkadot/>

Rio dApp Runtime Module

Rio Chain creatively proposes the following request-merge processes for third-party dApp integration and operation, providing two types of contract development platforms for the dApp developers to choose:

1. dApps based on the chain itself are integrated into native Rust and WASM code.
2. dApps based on the smart contract platform provided by the chain.

The first choice will bring a new experience to the development of dApps. It gives more permission to the dApp developers, and it's especially helpful if they want to build a system-level function. To ensure the stability and security of the chain, there will be some restrictions on the third-party dApps which run as Substrate runtime modules. For example, all the cross-module invokes will be carefully reviewed and tested to verify that they do not pose any operational or security risks.

Scalability

Rio Chain uses a Proof-of-Authority consensus protocol. In PoA-based networks, transactions and blocks are validated by approved accounts, known as validators. Validators run software allowing them to put transactions in blocks. The process is automated and does not require validators to be constantly monitoring their computers. It does require maintaining the computers (the authority nodes) uncompromised. The term was coined by Gavin Wood, co-founder of Ethereum and Parity Technologies.

Using PoA allows Rio Chain to reach transaction throughput of up to 3,000 transactions per second, while existing Blockchains' transaction throughputs seldom exceed a few transactions per second (around 5 TPS for Bitcoin and 16 TPS for Ethereum).

Upgradability

Substrate is architected to be as generic as possible in order to give maximum technical freedom when designing a blockchain. It has a 100% abstract "execute block" function encoded in WebAssembly that can be targeted from any one of a number of languages, including C++ and Rust. The execute block function is hot-swappable, meaning that a chain's logic can be upgraded without a hard fork.

Consensus is likewise generalised. The API allows for rolling out customizable consensus mechanisms, and it can handle most consensus algorithms available today. Substrate 1.0 Beta provides a combined Aura/GRANDPA consensus, with more consensus algorithms to be provided in subsequent releases. Consensus can be hot-swappable, meaning a blockchain can start with one consensus mechanism and switch to another down the line without a hard fork.

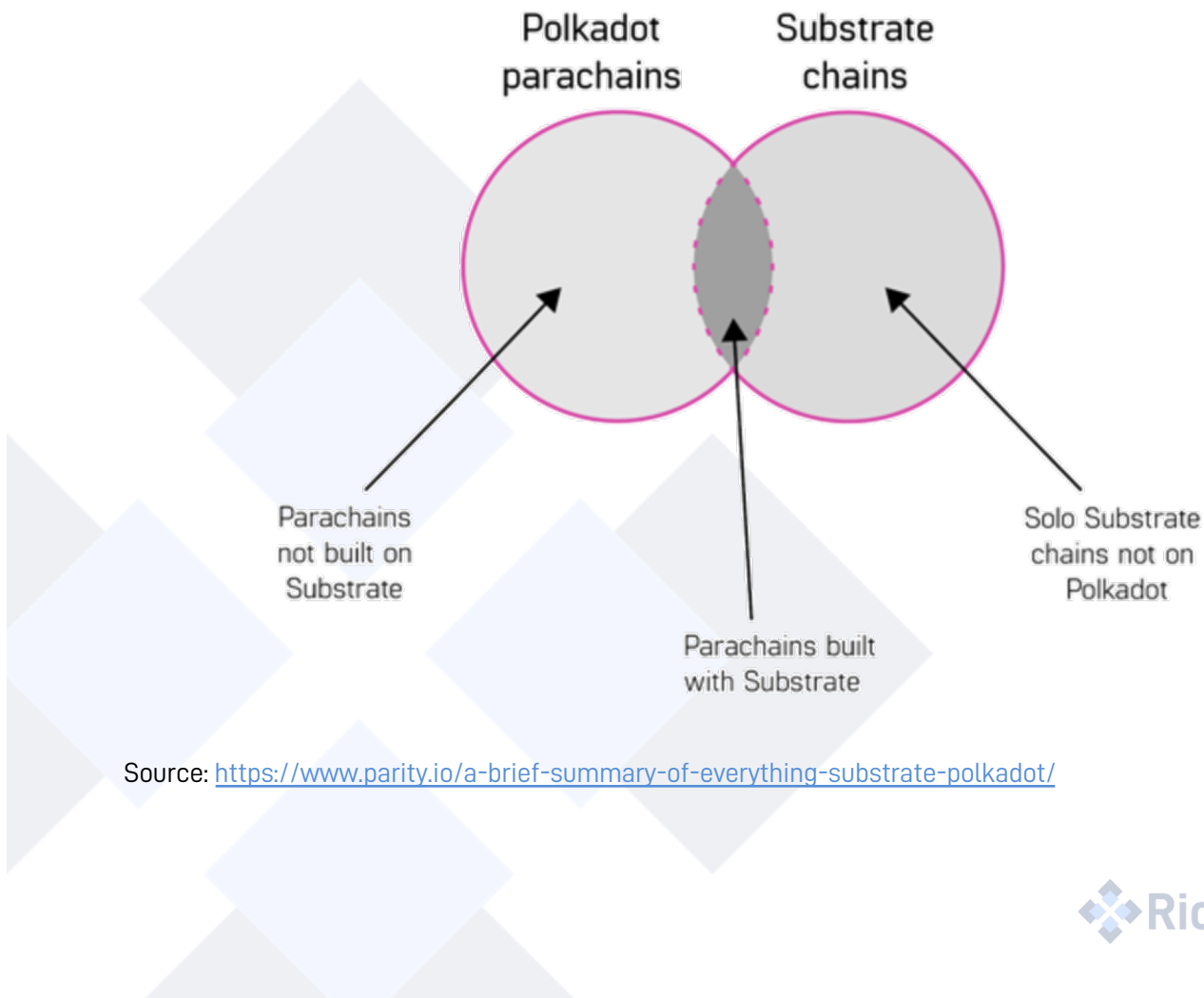
Source: <https://www.parity.io/substrate-has-arrived/>

Interoperability

As mentioned above, Rio Chain is a Parity Substrate-based blockchain that utilizes Polkadot technology for its cross-chain compatibility. Polkadot is a sharded blockchain based on the thesis that the world will have several blockchains that need to interact. Polkadot unites scalability, interoperability, and security. The Polkadot network uses a sharded model where shards - called "parachains" - in the network have unique state transition functions (STF).

Based on Polkadot's design, as long as a chain's logic can compile to Web Assembly (WASM), then it can connect to the Polkadot network as a parachain. Polkadot has a Relay Chain acting as the main chain of the system. Parachains construct and propose blocks to validators on the Relay Chain, where the blocks undergo rigorous availability and validity checks before being added to the finalized chain. As the Relay Chain provides the security guarantees, collators don't have any security responsibilities, and thus do not require a robust incentive system.

Source: <https://wiki.polkadot.network/docs/en/learn-introduction>



Source: <https://www.parity.io/a-brief-summary-of-everything-substrate-polkadot/>

Rio Generic Asset Bridge

For cross-chain interoperability, the core developmental task is designing how to bring one blockchain's assets onto other blockchains in a secure and transparent manner. Currently, many blockchain networks are pursuing "trustless" cross-chain approaches, such as Lightning Network and Liquid sidechain. But, after years of development, such applications are still not mature enough for mainstream adoption. Either the user experience is too complex, or there is not enough functionality to cover the cross-chain assets. We prefer to adopt a Federation based cross-chain mechanism (Federated Blockchain).

In its initial phases, Rio DeFi is utilizing cold storage multi-sig wallets to joint-custody the assets for Rio Chain. This process creates a seamless, cross-chain transfer link, ensures security, and eliminates the risk of a single point of failure.

The Rio Generic Asset Bridge supports simultaneous cross-chain transfers of multiple assets, and the end-to-end functionality can be summarized as follows:

1. A user locks an asset (e.g. Bitcoin) on the original chain by depositing the asset in the custodial account.
2. The mapped asset is issued to the user's address on Rio Chain.
3. The new Rio Chain asset can then be transferred between users or used in dApps on Rio Chain; all Rio Chain asset transactions are finalized within 2 seconds of transfer.
4. A user with a non-zero asset balance requests a withdrawal from Rio Chain to their designated address on the original chain (e.g. Ethereum blockchain).
5. The asset is then unlocked and sent to the user's designated address on the original chain.

The design of this universal gateway is mainly divided into **Generic Deposit Gateway** and **Generic Withdrawal Gateway**.

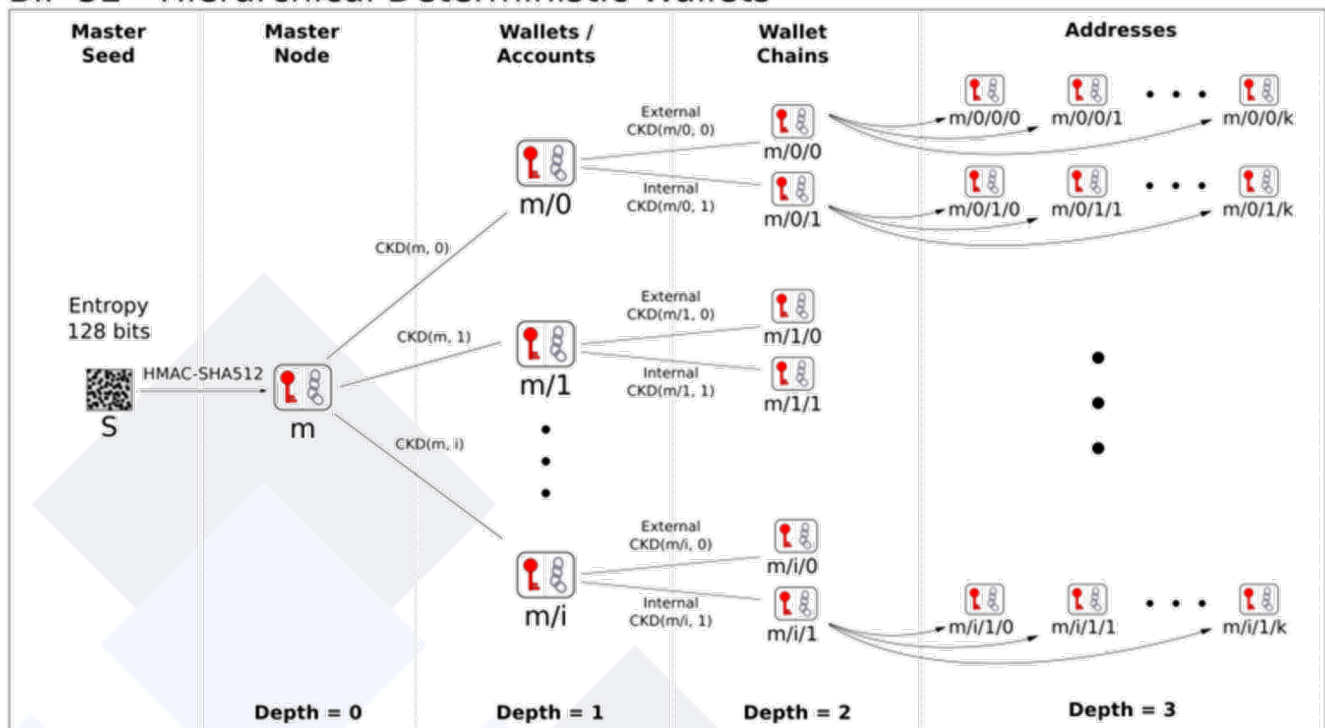
Generic Deposit Gateway

By integrating the BIP-32 mechanism, Rio Chain implements an open, auditable Generic Deposit Gateway mechanism. Through this mechanism, users will get a unique deposit address corresponding to their Rio address, and the deposit address generation process is open and transparent. The deposited assets are securely held in insured cold storage multi-signature wallets. The whole deposit process does not touch the network.

The implementation process is as follows:

1. For a blockchain that requires access to a deposit gateway, Rio Chain generates a public-private key pair. The private key is securely stored offline, and the public key is used as the **xpub key** to generate the deposit address.
2. Using BIP-32 derivation rules and an xpub key to derive the deposit address of the corresponding index user, the calculation method is as follows: **CKDpub((Kpar, cpar), i) → (Ki, ci)**. **i is index, starting at 0**, increasing by the number of users.
3. User initiates a deposit transaction on Rio Chain by sending the original asset to the derived deposit address; this automatically binds the relationship between the corresponding asset deposit address and the user's address that's generated on the chain.

BIP 32 - Hierarchical Deterministic Wallets



Child Key Derivation Function ~ $CKD(x,n) = HMAC-SHA512(x_{Chain}, x_{PubKey} || n)$

Source: <https://github.com/bitcoin/bips/blob/master/bip-0032.mediawiki>

Generic Withdrawal Gateway

The withdrawal gateway is designed to implement an on-chain review process based on permission control, with a gateway design similar to an exchange's withdrawal process. The withdrawal process is as follows:

1. User initiates a withdrawal request.
2. Rio Chain deducts the corresponding funds from the user's mapped Rio Chain asset balance in advance and enters the approval process.
3. Rio DeFi reviews and checks the information.
4. If the approval is successful, the original asset withdrawal process is initiated, and Rio DeFi signs the transaction using a hardware wallet to broadcast the transaction to the original chain's network. When there are enough confirmations, the transaction is marked as completed.
5. Once the original asset is successfully withdrawn, Rio Chain automatically burns the mapped Rio Chain asset.

Note: If the review process fails, the refund process is initiated, returning the pre-deducted funds to the user and marking the withdrawal as a failure.

Accessibility

Rio DeFi's core technologies are all accessible via the riodefi.com website, including:

1. **Rio Wallet** is the main way users interact with Rio Chain or access any of the applications that populate the Rio ecosystem. Rio Wallet incorporates an OAuth authentication system, allowing users to create a Rio Wallet, access their assets, and manage their private keys using their email or social media accounts.
2. **Rio Block Explorer** allows users to monitor the network and view transaction receipts. They can, for example, enter a Rio Wallet address to view its contents and get visibility to all its transactions within the network. Rio Block Explorer gives information on the fee paid per transaction, the block height the transaction was included in, how many confirmations took place, and more.

Rio DeFi is working in collaboration with Certik, one of the best security audit and penetration testing companies in the world, to ensure our technology is robust, hacker-resistant, and provides a secure user experience.

Features

Blockchain for Mass Adoption

Compared to other blockchains, Rio Chain represents a shift in network design and development philosophy. Below is a breakdown of the key features of the Rio network and their respective benefits for developers and end users.

Transparency	By entering a public address in the Rio Block Explorer, users can see holdings, transactions, and network data related to that account. On-chain activity is open for all to see.
Block Creation Time	2s
Interoperability	Projects built on Rio Chain can be compiled using a separate client to communicate with other chains.
Client Requirements	Light nodes, rather than full nodes, do not need to run 24/7 or read and write a lot of information on the blockchain. Users can work locally via mobile devices.
Upgradable Chain	Separation of runtime components, allowing easy runtime upgrades; Rio Chain can easily be upgraded without requiring a hard fork.
Flexible Consensus	On Rio Chain, thanks to the Aura consensus algorithm, finality is reached with each new block created.
Efficient Deterministic Sandbox WebAssembly Runtime	Virtual machine interpreters with available toolkits; using WebAssembly, dApps can be built using different smart contract languages.
Seamless Client Upgrades	Updates that affect consensus are compiled using WebAssembly, and developers can store as many versions of consensus code as they want to compile with native code. Rio Chain handles this complexity to ensure that the native code being executed is consistent with the currently deployed WebAssembly code.

A Next Generation Blockchain Network

Rio Chain iterates over previous generations of blockchain networks such as Bitcoin and Ethereum. To facilitate business use cases at scale, Rio Chain introduces interoperability, enabling cross-chain transactions, and increases network speeds, transaction throughput, and computational efficiency.

- **Customizable consensus algorithm**
 - Supports licensed blockchains and different consensus algorithms (PoS, PoW, PoA, etc.)
 - Support for customizable adjustments
- **Support for network updates on the chain**
 - The new contract can be deployed without upgrading the nodes and without a hard fork in the chain
- **High TPS**
 - Up to 3000 Transaction per Second (TPS on PoA)
 - Ability to scale horizontally to extend TPS
 - Supports finality
 - Existing blockchains, like bitcoin and ethereum, follow the longest chain rule but lack finality. Rio Chain supports finality.
- **Smart Contract**
 - The WASM contract is compatible with Rust C/C++, C#, Typescript, Haxe, and Kotlin
 - Draws a line between finality and non-finality
 - Greater security

Competitive Analysis

	Rio Chain	Bitcoin	Ethereum	EOS
Types	Federated chain	Public chain	Public chain	Public chain
Tamper-proof	✓	✓	✓	✓
Auditable	✓	✓	✓	✓
Safe	✓	✓	✓	✓
Consensus algorithm	PoA	PoW	PoW	DPoS
Permissioned	✓	X	X	✓
TPS	Up to 3,000	5	16	2000+
Block Creation Time	2 seconds	10 mins	16 seconds	0.5 seconds
Finality	✓	X	X	✓
Smart contract Authoring language	Rust C/C++ etc.	Bitcoin Script	Solidity	Java C++
Assets issued	✓	✓	✓	✓
Platform tokens	RFUEL	BTC	ETH	EOS

Economic Model

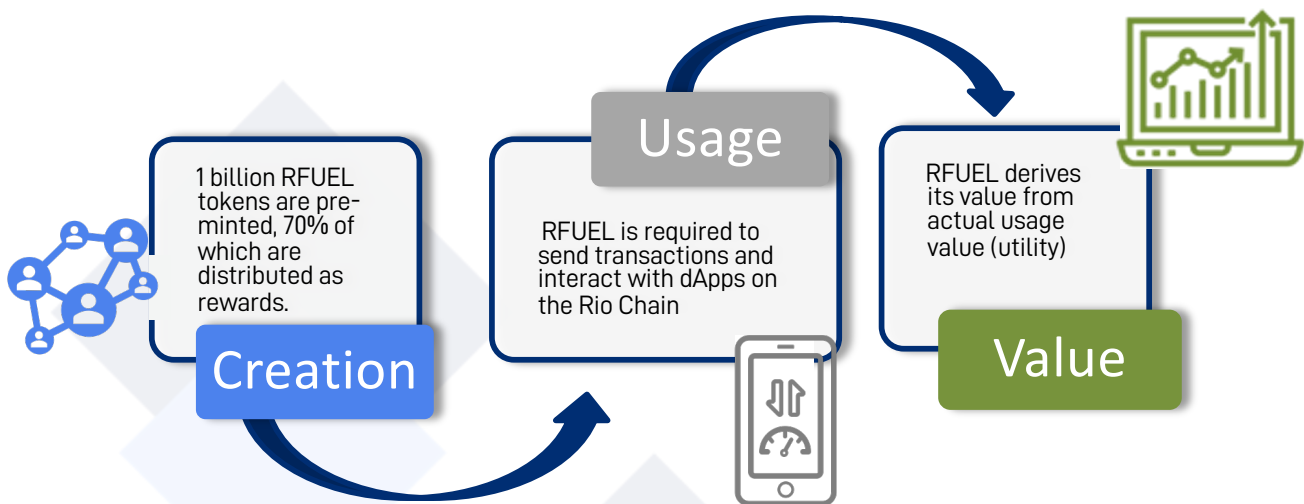
Incentive Mechanisms

In order to encourage the participants of the Rio ecosystem to cooperate and to reward the nodes for maintaining the network's integrity, Rio Chain uses various incentive mechanisms.

Central to this economic model is Rio Fuel (RFUEL), which is a unit that compensates for the computational resources used to execute operations on Rio Chain.



- RFUEL is Rio Chain's native platform (gas) token
- It is required to conduct a transaction or execute a smart contract



Rio Fuel (RFUEL) Distribution Model

1 billion Rio Fuel (RFUEL) tokens will be created through a token generation event (TGE): 70% of these tokens are being distributed as rewards based on the model below, 20% will be sold via community crowdsales and private sales, and 10% will be maintained as reserves that will slowly release over 5 years.

Promotional (locked) RFUEL will be distributed as follows:

New User Incentives*: 50 million RFUEL (5%) will be distributed for free to new Rio Wallets at a rate of 10 RFUEL per wallet for the first 5 million unique mobile wallets (based on device IDs). Note that these promotional RFUEL tokens will be locked, meaning that they can only be used to pay for transaction fees, cannot be transferred to other users, and will only be valid until January 31, 2026. After that time, all promotional tokens will automatically be burnt.

Unlocked RFUEL will be distributed as follows:

Staking Rewards: 350 million RFUEL (35%) will be distributed to those staking RFUEL and validating transactions on the network. The APR generated through staking will vary depending on the staking year and the total % of staked RFUEL.

Referrals, Promotions, and Bounties: 50 million RFUEL (5%) will be released for Rio Wallet Mobile App referrals, exchange & community promotions, and bounty programs. Rio Wallet users who share the Rio Wallet mobile app with their friends will receive 5 free RFUEL, and their friends who download the Rio Wallet mobile app via referral codes will also receive 5 free RFUEL (note: the refer-a-friend RFUEL will be distributed as promotional locked RFUEL subject to the same terms as the new user incentives above).

Rio DeFi Team & Advisors: 150 million RFUEL (15%) will be distributed to the Rio DeFi team & advisors. There is a 2-year vesting schedule with a 6 month cliff, meaning that the team & advisors will receive no tokens for 6 months and then will receive 1/18 of the total amount per month over the following 18 months.

Rio Ecosystem Fund: 100 million RFUEL (10%) will be distributed as grants to fund projects built within the Rio Chain ecosystem. Grant proposals will be submitted to Rio Technologies Foundation and voted on by its counsellors. These grants will be for dApps, chain runtime modules, templated smart contracts, etc. All Rio Ecosystem Fund tokens will be locked until grant approval.

Reserves: 100 million RFUEL (10%) will be maintained as reserves. 10 million (10%) of these reserve RFUEL tokens will be used for market liquidity provisions at the outset of TGE and are expected to remain with Rio Technologies Foundation for future re-allocation. The remaining 90% will be unlocked on a rolling basis at a linear release rate starting day 366 since TGE such that 100% of reserve tokens will be unlocked by the end of the 5th year since TGE (roughly 1,826 days since TGE).

Community Crowdsales: 50 million RFUEL (5%) will be distributed to those who purchase RFUEL during the community crowdsales.

Private Sales: 150 million RFUEL (15%) will be distributed to Private Sale purchasers. The majority of these RFUEL tokens will vest over 151 days, with 1/6 of the tokens being distributed at Token Generation Event (TGE) and on days 31, 61, 91, 121, and 151 after TGE. The remainder of these tokens will be unlocked at TGE.

RFUEL Distribution	Token Amount	Percentage (%)
New User Incentives (locked)	50,000,000	5%
Staking & Validation Rewards	350,000,000	35%
Referrals, Promotions, and Bounties	50,000,000	5%
Rio DeFi Team & Advisors	150,000,000	15%
Rio Ecosystem Fund	100,000,000	10%
Reserves	100,000,000	10%
Community Crowdsales	50,000,000	5%
Private Sales	150,000,000	15%
Total	1,000,000,000	100%

Staking & Validation Rewards Distribution

Staking Year	Circulating Supply Est.	Rewards Given	Avg. APR (%)
2020 - 2021	170,000,000	60,000,000	60%
2022	370,000,000	100,000,000	54%
2023	600,000,000	110,000,000	37%
2024	730,000,000	50,000,000	14%
2025	890,000,000	30,000,000	7%
2026	950,000,000	0	0%

Estimation Notes / Assumptions:

- Circulating supply est. is the estimated amount at the beginning of each year
- Avg. APR is estimated based on a 50% staking rate of the circulating supply

dApp Platform

Rio Chain hosts carefully selected decentralized applications (dApps). Our protocol is designed to accommodate high performance software solutions, which in return will contribute to the platform's economy. dApps will generate revenues in the form of fees collected for transactions processed by Rio Chain.

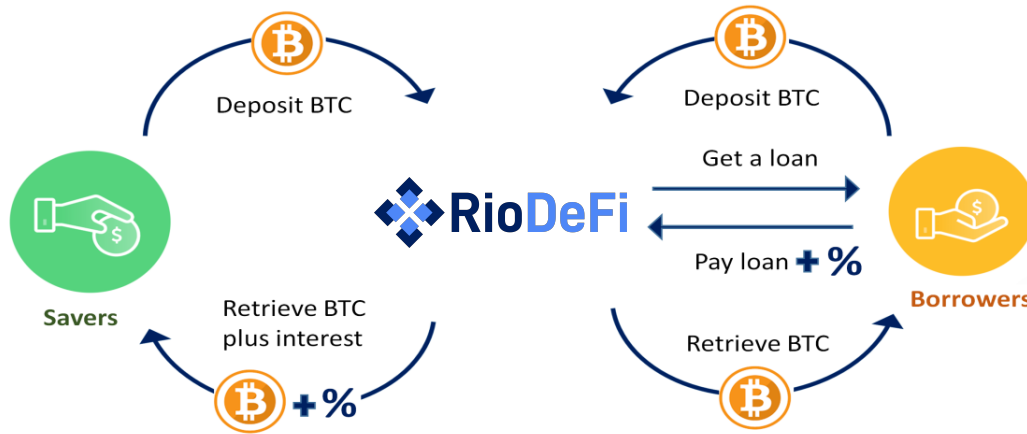
80% of all transaction fees go to the Rio Chain Node Operators (those processing transactions and securing the network) and 20% are retained by the dApps. This 20% for dApps is a novel economic model that creates a huge incentive for developers to build on Rio Chain, because they'll get RFUEL for every on-chain transaction their dApp generates.

Thanks to its unique properties and performance level, Rio Chain can support applications that would be unimaginable on existing blockchain infrastructures. The following sections will cover some of the use cases that this type of technology is most suited to support.

Financial Applications

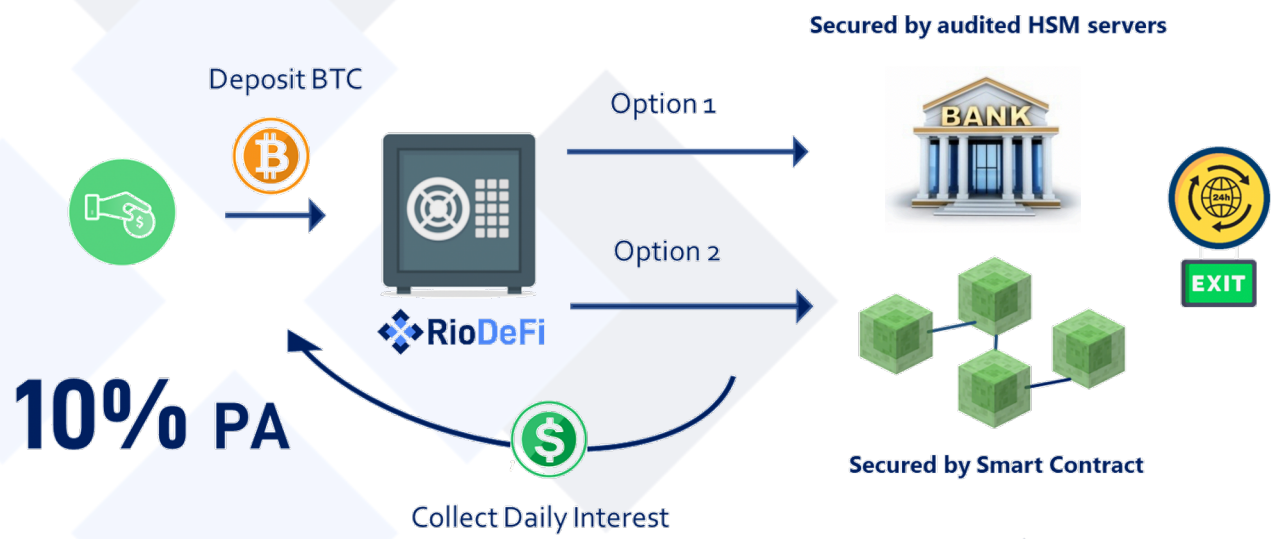
Bitcoin Lending Platform

Rio Chain can be used to support a lending platform where Bitcoin owners can either lend or borrow from each other. Lenders can earn interest on their Bitcoin while borrowers can get an instant loan against their Bitcoin used as collateral.



Bitcoin Savings Accounts

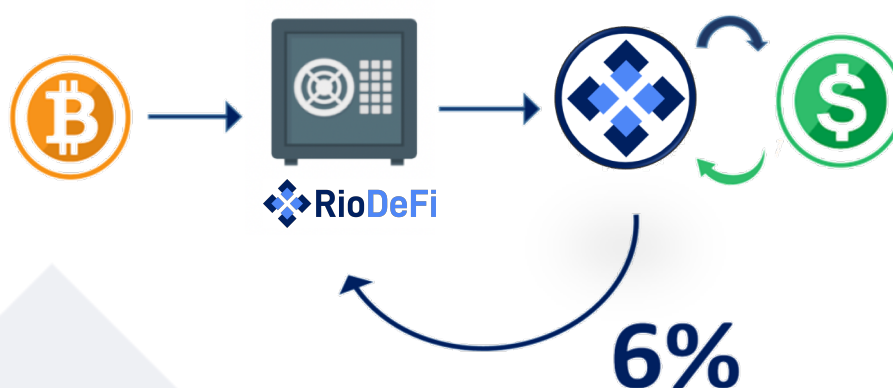
Rio Chain can secure Bitcoin and other cryptocurrency deposits while providing much higher interest rates when compared to traditional, bank-based saving accounts, all while benefiting from price increases in the underlying cryptocurrency assets.



Using Rio Chain technology and bank security will give Bitcoin owners the possibility to constantly monitor their deposits while earning as much as 10% interest per year. How can so much interest be earned for depositors? Nearly all loan interest goes directly back to depositors.

Instant Loan Programs

Rio Chain is very well suited to implement programs where users can obtain instant loans of up to 65% of the value of their Bitcoin and other digital assets. Such loans can be issued in the form of a stablecoin whose value is pegged 1:1 to the US dollar. This stablecoin would be fully backed by digital assets and its minting and burning controlled by Rio Chain.



Why use a stablecoin? Lending and borrowing require an element of stability and an element of trust from both parties.

Bitcoin's price is very volatile, making the value of a loan made in Bitcoin unpredictable over time. Stablecoins provide consistency and price stability to the entire process. By using blockchains to process and secure transactions, stablecoins provide both the lender and the borrower with the element of trust.

The combined use of a stablecoin and blockchain technology allows the lending process to be more efficient and inexpensive since all operations can be executed on the same platform.

Finally, and perhaps more importantly, this mechanism allows constant monitoring of the assets and transactions occurring on the network, making it more transparent and secure than traditional lending mechanisms.

Decentralized E-commerce

An Industry Ripe for Disruption

Under the current e-commerce paradigm, merchants are stuck in between a rock and a hard place when it comes to reaching shoppers. E-tailers depend on e-commerce behemoths to reach customers, which involves the payment of large fees that eat into their profits. To compound the problem, these merchants are missing out on precious data about their customers, preventing them from enacting strategies that will fuel further growth.

Blockchain technology promises to reshape the landscape of e-commerce the same way the last generation of internet-based innovations did. Together with new methods of distribution, more effective methods of leveraging purchasing power, and improved efficiencies in logistics, blockchain technology will usher in the next generation of e-commerce.



Blockchain use case for ecommerce. Source: disruptodaily.com

Rio Chain is Built for Scale

When trying to implement such solutions, however, the limitations of existing blockchains come to the forefront. Closed systems that lack scalability can't accommodate such a transaction-heavy, multi-party system. Rio Chain has been developed with these types of scenarios in mind. Thanks to its vastly superior speed, transaction throughput, and ability to interconnect various networks, Rio Chain will pave the way for the decentralization of e-commerce.

Crypto-Fiat Gateway

Partnerships with Banks

True to its mission to bridge traditional and decentralized finance, Rio DeFi is establishing partnerships with various European banks to help us facilitate the introduction of the general public to Bitcoin and other digital assets. Our philosophy is that we should work with banks, not against them, in order to increase the global reach of financial services.

The properties of Rio Chain allow us to implement payment solutions that combine the best practices of both traditional and decentralized finance. They allow us to connect non-technical people to the benefits of digital assets, including faster cross-border payments, lower transaction fees, and global spending options, while still maintaining traditional financial features such as secure custodial storage, audited processes, good customer service, account recovery options, and excellent liquidity.

1 / **BANKS**
Custodian services
For Savings and
Loans Programs



Our banking partners will provide custodian services for savings programs and loan agreements for instant credit lines.

2 / **LIQUIDITY**
Debit card
OTC desks



We will provide liquidity options through OTC partners and debit cards linked to Rio Wallets, allowing people to withdraw and spend cash all around the world.

3 / **PAYMENT**
Contactless
payment system

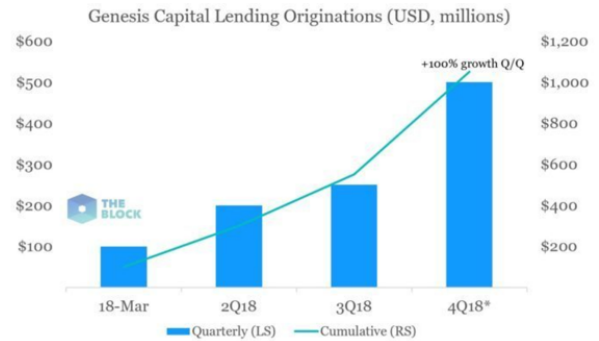


We're also in the process of establishing Rio Pay, a contactless payment system to pay directly from your phone or NFC-enabled debit cards.

Market Opportunities

Cryptocurrency Lending Market

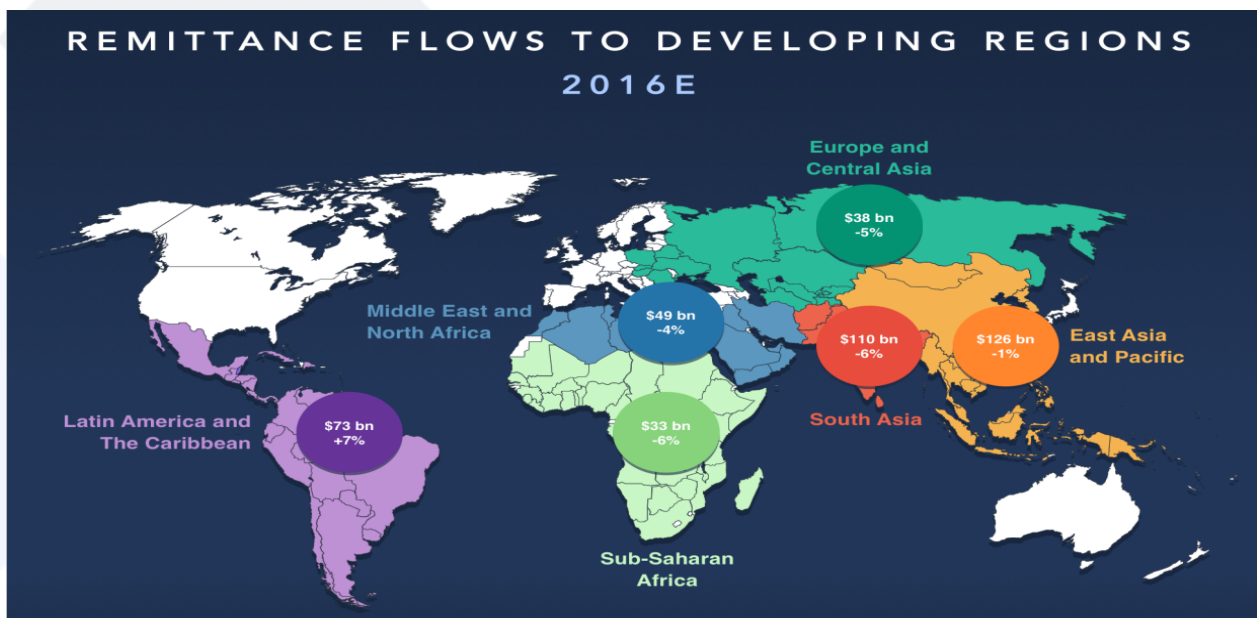
The cryptocurrency lending industry has enjoyed tremendous growth over the past few years. Over \$5 Billion in funds have been loaned out to-date. Overall the amount of cryptocurrency deposits has seen 1,000%+ growth over the period of 2018-2019. Currently, over \$1 Billion of digital assets are locked up in the DeFi ecosystem.



With Bitcoin's next halving occurring this year, mining rewards will drop from 12.5 BTC per block to 6.25. In light of this, many experts in the space believe there will be a massive increase in the Bitcoin price. People are looking to accumulate more Bitcoin now before the halving event occurs.

Remittances and Cross Border Payments

Additionally, cross-border transactions have recently experienced annual growth rates around 9% and are expected to increase to \$2.9 Trillion in revenue annually by 2022. Rio DeFi products and services like Rio Pay will tap into this growing revenue stream.



Disclaimers

Legal Implications of Token Launches

Rio Fuel (RFUEL) tokens are functional utility tokens within Rio Chain, which is a fully-functional, Substrate-based blockchain with a digital currency wallet, node explorer, and dApps. RFUEL tokens are not securities. RFUEL tokens are non-refundable. RFUEL tokens are not for speculative investment. No promises of future performance or value are or will be made with respect to RFUEL, including no promise of inherent value, no promise of continuing payments, and no guarantee that RFUEL will hold any particular value. RFUEL tokens are not participation in the Company and RFUEL tokens hold no rights in said company. RFUEL tokens are sold as a functional good and all proceeds received by Company may be spent freely by Company absent any conditions.

Licenses and Approvals

Licenses and Approvals Licenses and approvals are not assured in all jurisdictions. Rio DeFi intends to operate in full compliance with applicable laws and regulations. The views and opinions expressed in this whitepaper are those of Rio DeFi and do not reflect the official policy or position of any government, quasi-government, authority or public body (including but not limited to any regulatory body of any jurisdiction) in any jurisdiction. This whitepaper has not been reviewed by any regulatory authority.

Third Party Data

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THE NEXT FRONTIER OF FINANCE

