Topoi Whitepaper 2024 | Version 1 | English

WHITEPAPER

The Journey of Financial Self-Sovereignty

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1 Introducing Topoi: Embarking on the Journey of Financial Self-Sovereignty

Who are we?

We are a fully decentralised Web3 Finance hub integrating a multichain payment system and protocol that plays a crucial role in facilitating interoperability between the traditional fiat system and our new generation modular ZK blockchain technology.

The term “Topos” originates from ancient Greek, where it means “place” or “location.”

“Topoi,” the plural of “Topos,” are mathematical realms where abstract ideas come to life and connect, reflecting the intricate beauty of mathematics. They offer a playground for exploring structures and relationships, allowing mathematicians to see the harmony and unity in diverse mathematical phenomena.

In the dynamic world of fintech, Topoi stands at the forefront of innovation, challenging the norms and redefining the future of payments, where every transaction embodies the essence of flawless simplicity and boundless possibility.

At Topoi, we believe in a world in which payments are not just transactions but gateways to empowerment. With our visionary approach, we are breaking barriers, connecting continents, and transforming the way money moves. With Topoi, the possibilities are limitless. Imagine a world where borders are blurred, and financial inclusion knows no bounds. Our cutting-edge platform enables instant, borderless payments, bridging the gap between traditional finance and the decentralised frontier of cryptocurrencies.

But Topoi is more than just a fintech company; it is a catalyst for change, a force for good in an ever-evolving landscape. It is the place where all converges: Topoi users can bridge assets across different blockchain protocols, promoting instant liquidity, accessibility, and highly scalable efficiency within the broader cryptocurrency ecosystem.

With our unwavering commitment to innovation and customer-centricity, we are empowering individuals, businesses, and communities, encouraging them to thrive in the digital age.

Join us on this journey of discovery and reinvention. Together, let us reimagine the future of finance, in which every payment is a testament to our collective vision and the transformative power of technology.

Our Vision: following the steps and ethics of Satoshi Nakamoto

How has the fundamental aspiration of Satoshi Nakamoto and the origin of Bitcoin inspired us?

In 2008, the financial system experienced a major crisis that originated in the United States and caused a ripple effect across the global economy. The crisis was triggered by a combination of factors, including the collapse of the subprime mortgage market, the housing bubble, and the excessive risk-taking behaviour of financial institutions. Bitcoin was created as a response to the flaws within the traditional financial system, such as centralisation, lack of privacy, and high fees in cross-border transactions.

Satoshi Nakamoto's whitepaper proposed the concept of a fully decentralised, digital currency that could be used for peer-to-peer transactions without the need for intermediaries, and so Bitcoin was created as a practical implementation of this idea. 15 years have passed since the original inception: Bitcoin has become a global phenomenon with its decentralised, secure and transparent architecture, attracting users from all over the world.

Topoi is our response to Satoshi Nakamoto's whitepaper, inviting anyone willing to improve the existing financial system to join the network and participate in its development with the idea that our money can be self-sovereign.

Our Motto: giving the power back to the people

How are we going to do that?

Decentralisation: Topoi is fully decentralised, which means that we are not controlled by any central government, organisation or individual. This gives users more control and autonomy over their own finances.

Increased Access: Topoi enables individuals to participate in its ecosystem, regardless of their location, social status, or credit score. It provides increased access to marginalised communities, including the unbanked. It is free for a user to create a wallet on the Topoi Ecosystem.

Privacy: We believe that users should be able to make transactions without compromising their privacy. Topoi's objective is to be censorship resistant.

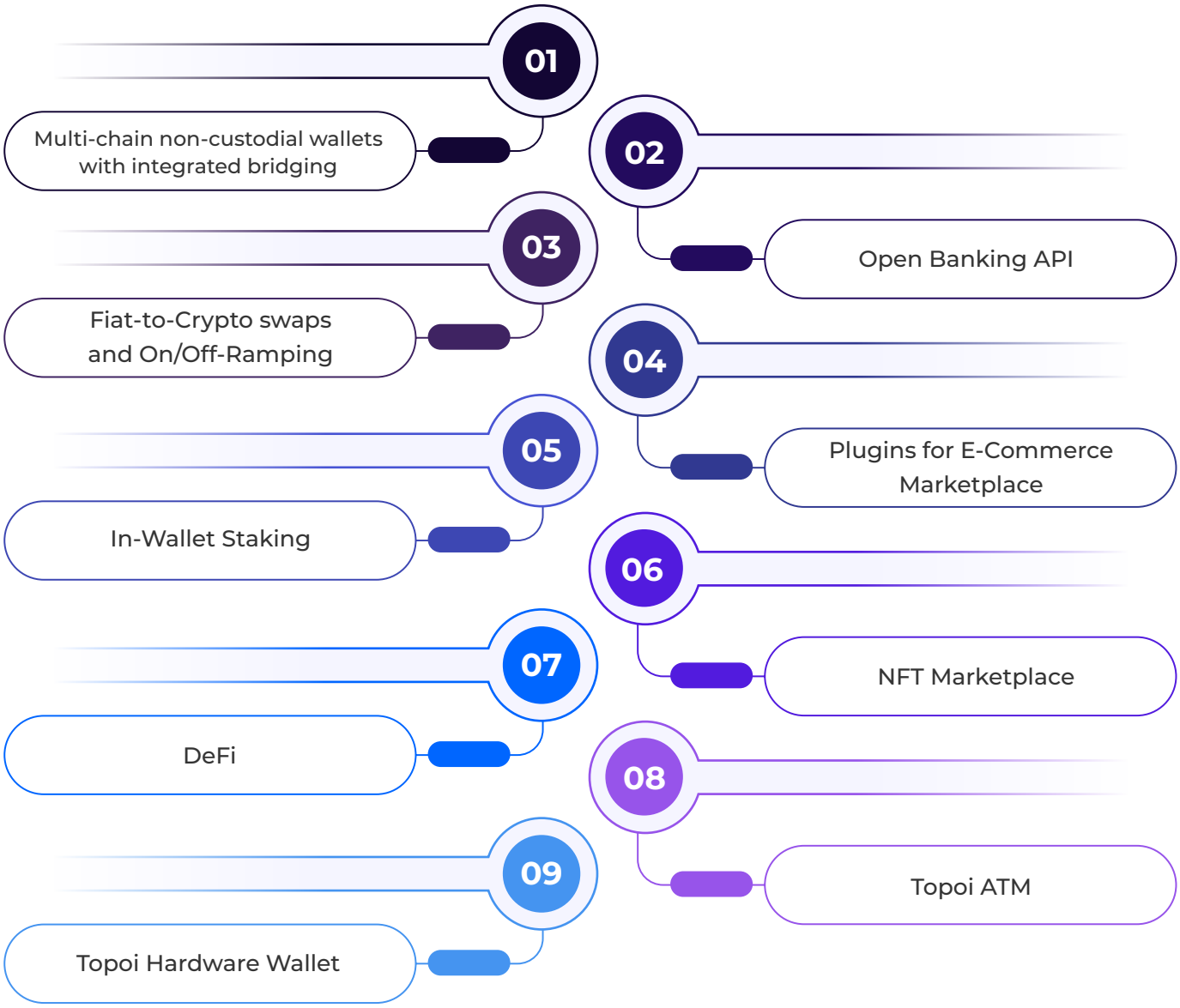
Empowering users: Topoi gives users the ability to take control of their financial lives without relying on intermediaries. We provide the ability to manage finances without the need for a bank account. You own your private key; you own your wallet.

Transparency: Topoi operates on a public blockchain, which provides increased transparency and accountability.

We believe in our capacity to create tools and provide the ecosystem to help empower individuals to take control of their finances and economic well-being. By removing barriers to financial access, by supporting the fundamental right to the true ownership of private property and increasing transparency, we can give the power back to the people.

2 Topoi's Products and Services

List of Our Products



Seamless experience with Topoi

What we offer

Integration with Traditional Banking
Topoi aims to bridge the gap between the traditional financial system and the world of cryptocurrencies, by allowing users to link their bank accounts and use fiat currencies effortlessly alongside Bitcoin and other cryptocurrencies.

Convenience and Accessibility
Topoi mobile Decentralised Applications (DApps) provide users with easy access to a range of financial services, including money transfers, fiat-crypto currency exchange, and budgeting tools. Users can manage their finances on-the-go from their mobile devices, without the need to visit physical bank branches.

Fiat Multi-Currency Support
Topoi multi-currency wallets, with the capacity to hold and spend in multiple currencies, are convenient for users who frequently travel or conduct business internationally. Users can avoid currency conversion fees and exchange rates offered by traditional banks.

Instant Payments
Topoi enables instant payments by leveraging the Topoi Network, which allows transactions to be processed off-chain, significantly reducing confirmation times and transaction fees.

Low Fees
Topoi charges lower fees for international transfers and currency exchange compared to traditional banks. Topoi ATM withdrawals will be available to our customers with no additional charge. This can result in cost savings for users, especially for those who frequently travel or make international transactions.

Cross-Border Transactions
Users can send money across borders without the need for traditional banking intermediaries, resulting in faster and cheaper transfers compared to traditional remittance services.

Merchant Payments
Topoi also offers solutions for businesses, allowing merchants to accept fiat, Bitcoin or other cryptocurrency payments directly from customers using the Topoi DApp. Payments made through Topoi are settled instantly, allowing merchants to receive funds in real-time without the need to wait for bank transfers or payment processing delays.

Implementation of optional Chargebacks
Topoi's payment system is built on top of the Topoi blockchain, which offers flexible, reversible transactions through smart contracts. This means merchants are protected from the risk of chargebacks, which are common in traditional payment systems, in addition it can also protect customers from potential fraud online, allowing them to claim their chargebacks.

Integration with Existing Systems
Topoi offers APIs and integration tools that allow merchants to seamlessly integrate its payment solutions with their existing e-commerce platforms, websites, or point-of-sale systems.

Currency Conversion
The Topoi platform supports automatic currency conversion, allowing merchants to accept payments in Bitcoin or other cryptocurrencies and\or receive funds in their preferred fiat currency.

Enhanced Security
The Topoi payment system utilises the same cryptographic security features as Bitcoin, providing merchants with enhanced security and protection against fraud and unauthorised transactions.

Partnerships
Topoi aims to form future partnerships with various companies and organisations to expand its reach and enhance its services. These partnerships include collaborations with other payment processors, other blockchain solutions companies, financial institutions, and cryptocurrency exchanges.

Topoi is positioned as a disruptor in the payments industry, offering a novel approach to global transactions by taking advantage of blockchain technology and its network. With its focus on instant, low-cost payments and seamless integration with traditional banking systems, Topoi aims to revolutionise the way people send and receive money across the globe.

Use Cases

Here are the main use cases:

USERS			
INDIVIDUAL	BUSINESS		
◉	◉	1	**Bank-to-Bank Fiat Transfers:** Effortlessly transfer fiat currency between bank accounts.
◉	◉	2	**Fiat to Crypto Transfers:** Move fiat currency from a bank account directly to a crypto wallet.
◉	◉	3	**Multichain Bridge:** Facilitate transfers and interactions across different blockchain networks.
◉	◉	4	**In-Wallet Staking and Earning:** Stake cryptocurrencies directly within your wallet and earn rewards.
◉	◉	5	**Lending and Borrowing:** Utilise our decentralised, non-custodial liquidity market protocol for secure lending and borrowing.
◉	◉	6	**Decentralised Exchange (DEX):** Buy, sell, and swap liquidity using our DEX platform.
◉	◉	7	**Liquidity Derivatives:** Buy and supply liquidity through our decentralised, non-custodial liquidity derivative market protocol.
◉	◉	8	**Fiat and Crypto Transactions:** Top up your card wallet in fiat or crypto, pay with the Topoi crypto debit card, or withdraw cash from our decentralised ATMs.
◉	◉	9	**Hardware Wallet Security:** Keep your digital assets secure with our advanced hardware wallet.
◉	◉	10	**NFT Marketplace:** Buy or sell digital tokenised assets on our decentralised NFT marketplace.
◉	◉	11	**E-commerce Integration:** Businesses can use our plugins to accept fiat and crypto payments on major e-commerce platforms.
	◉	12	**Merchant APIs:** Businesses can integrate our APIs to handle fiat and crypto payments through their own platforms.
	◉	13	**Financial Tools:** Access analytical tools, budget planning tools, and spending management tools to manage your finances effectively.
	◉	14	**Advanced Treasury Management:** Utilise our sophisticated treasury management tools designed for businesses.

Each of these use cases highlights the flexibility, security, and comprehensive functionality of our product suite, catering to both individual and business needs throughout the evolving financial landscape.

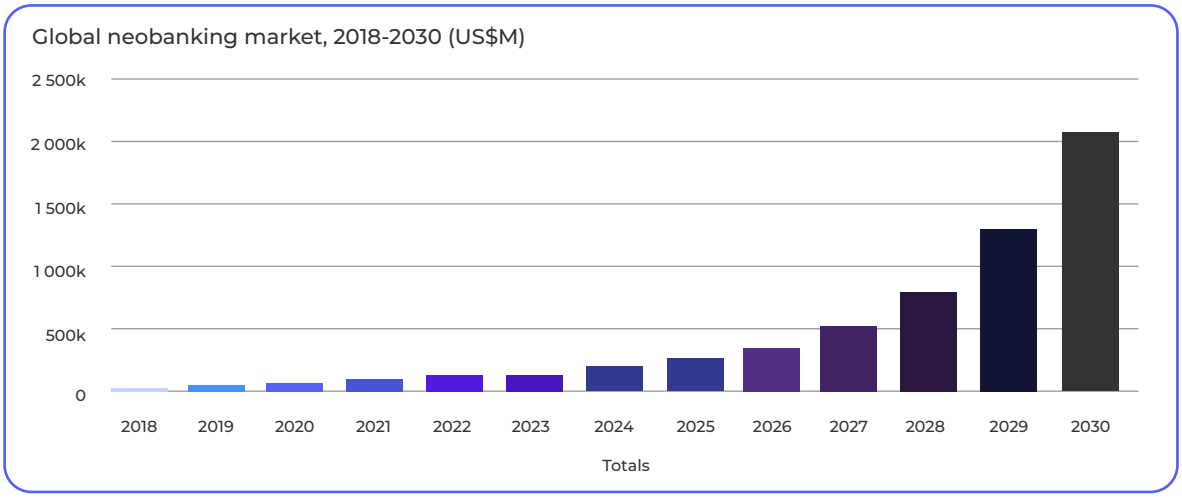
3 Current Market Analysis

Neobank Market — Statistics and analysis

Neobanking: a sector in expansion

The global neobanking market is experiencing steady growth towards 2030 due to several key factors driving innovation and transformation in the financial services industry. With the increasing adoption of digital payments, the rise of mobile banking, and a growing demand for financial inclusion, neobanks are positioned to become an essential tool able to respond to the evolving needs of consumers worldwide. Furthermore, partnerships with fintech companies enable neobanks to offer innovative services and products, enhancing their appeal and expanding their market reach. As a result, the neobanking sector continues to thrive, providing customers with convenient, accessible, and technologically advanced banking solutions.

Market size value in 2023	Revenue forecast in 2030	Growth rate
$96.14 billion	**$2,048.53 billion**	**CAGR of 54.8%** from 2023 to 2030



The above statistics illustrate a ripe opportunity for Topoi to seamlessly integrate with the current market landscape and unlock new horizons within this rapidly expanding sector.

Topoi Prospective customers

A diverse range of individuals and businesses who are already finding neobanks and fintech companies' services appealing can benefit from the use of Topoi. These include:

Tech-Savvy Consumers
Individuals comfortable with digital platforms and mobile banking apps can enjoy the convenience and flexibility offered by Topoi.

Millennials and Gen Z
Younger generations who prioritise digital interactions and value convenience over traditional banking services or neobanks may find Topoi particularly appealing.

Freelancers and Gig Workers
Topoi offers features tailored to the needs of freelancers and gig workers, such as real-time payment notifications, expense tracking, and streamlined integration with accounting software.

Small Businesses and Start-ups
Topoi provides agile and cost-effective payment solutions for small businesses and start-ups, offering innovative features, low fees, and customisable financial management tools.

Unbanked and Underbanked Individuals
Topoi can serve as a bridge to financial inclusion for unbanked and underbanked populations by offering accessible and affordable payment services and free wallets through digital channels.

Travellers and Expats
With low foreign transaction fees and competitive currency exchange rates, Topoi aims to become popular among travellers and expatriates who frequently make international transactions.

Tech-Driven Entrepreneurs
Entrepreneurs and innovators in the fintech space can benefit from partnering with Topoi to access advanced high-tech infrastructure, APIs, and developer-friendly platforms for building innovative and interoperable payment solutions.

Institutional Entities
Institutional entities looking to optimise their financial operations can benefit from Topoi through reduced costs, enhanced financial management, innovative products, faster transaction time, improved customer experiences, global reach, data-driven insights.

The problems Topoi aims to solve in the fiat payment industry

As of 2024, the fiat payment industry faces several pressing challenges which are prompting dissatisfaction with traditional banks among consumers and businesses alike.

These challenges stem from a combination of evolving consumer expectations, technological advancements, and regulatory changes:

Cybersecurity Concerns
With the increasing digitisation of financial transactions, cybersecurity threats pose a significant challenge for the payment industry. Cyberattacks targeting banks and financial institutions have become more sophisticated, leading to concerns about data breaches, identity theft, and financial fraud.

Rising Transaction Costs
Traditional banks often impose high fees and transaction costs on customers, including fees for account maintenance, overdrafts, and international transfers. These fees can erode the value of transactions and contribute to dissatisfaction among consumers and businesses seeking cost-effective payment solutions.

Slow Transaction Times
The traditional banking infrastructure is characterised by slow transaction processing times, especially for cross-border transactions. Delays in fund transfers can lead to inconvenience and frustration for individuals and businesses waiting for payments to clear.

Lack of Innovation
Many traditional banks have been slow to keep up with developing technologies and modernise their payment systems. This lack of innovation hampers the development of faster, more efficient payment solutions and leaves customers seeking more innovative alternatives. This can also lead to more cybersecurity issues.

Limited Accessibility
Traditional banks may have limited accessibility, particularly in rural or underserved areas. This lack of physical branches can hinder access to banking services for certain segments of the population, leading to frustration and disenchantment with traditional banking institutions.

Regulatory Compliance Burden

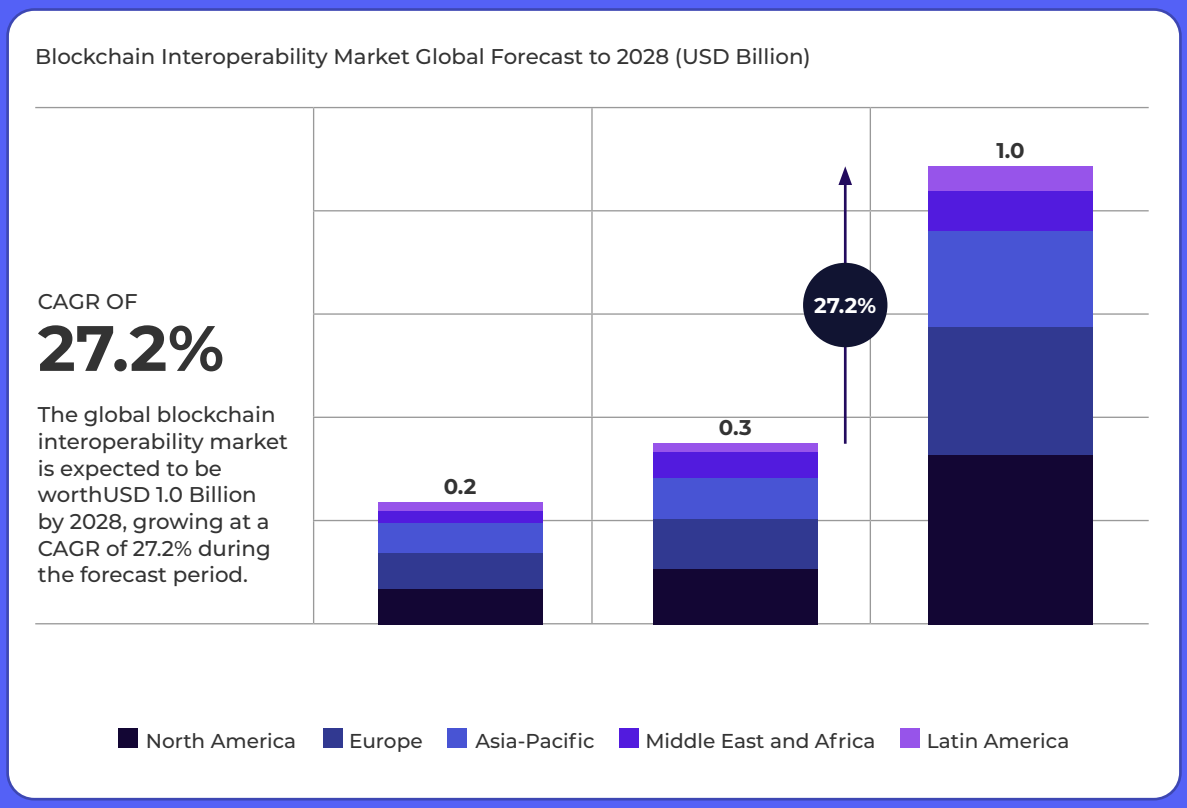
Banks must adhere to stringent regulatory requirements imposed by government authorities, which can increase operational costs and complexity. Compliance with regulations such as Anti-Money Laundering (AML) and Know-Your-Customer (KYC) requirements adds overhead and may result in inconvenience for customers.

Lack of Transparency

Some traditional banks have been criticised for their lack of transparency in fee structures, interest rates, and terms and conditions. Numerous instances of sudden account closures for both individuals and businesses, despite the absence of any fraudulent or suspicious activity, have left customers feeling angry and distressed. This opacity led to helplessness, distrust and dissatisfaction among consumers who feel they are not fully informed about the costs and risks associated with banking services.

Traditional banks are under increasing pressure to adapt and modernise their payment systems to meet the evolving needs and expectations of their customers. In response to these challenges, many consumers and businesses are turning to alternative payment solutions offered by fintech companies, neobanks, and blockchain-based platforms.

Topoi offers the best of traditional finance and crypto combined by bridging the gap between both worlds, addressing many of the sore points associated with traditional banking.



Current market competitiveness: Topoi versus Neobanks

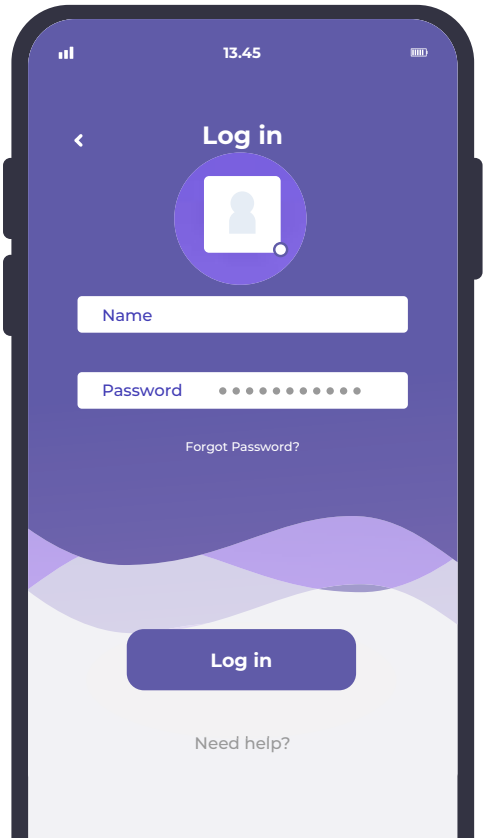
As dissatisfaction with traditional banking institutions continues to grow among consumers, there is a noticeable shift towards seeking out services that prioritise customer-centricity. Individuals disillusioned with the limitations of traditional banking institutions are actively seeking alternative, more tailored approaches to managing their finances. The neobanking sector has emerged as an enticing option for these individuals, attracting them with a myriad of advantages compared to traditional banking services, in addition to seamless integration with fintech solutions.

However European fintech companies, particularly those focused on rapid expansion, are struggling to keep pace with the rising tide of fraud and increasingly stringent compliance requirements. Neobanks are under heightened scrutiny regarding their compliance frameworks, which are tasked with combating a range of illicit activities from criminal transactions to fraudulent users. In response, these neobanks have significantly bolstered their compliance systems, often by integrating sophisticated external software solutions designed to address critical pillars such as KYC and AML. Despite these efforts, they are finding it challenging to stay ahead of evolving threats.

To mitigate these issues, some neobanks have turned to hiring more compliance personnel, but this approach is notably costly and not always sustainable. As an alternative, other neobanks have adopted hyper-aggressive monitoring strategies for customer accounts. While this can enhance security, it has also led to the indiscriminate and often unnecessary closure of accounts. This heavy-handed approach has resulted in increased dissatisfaction and a surge in complaints from affected customers.

The rise in financial fraud over recent years has exacerbated these challenges. Cybercriminals have developed sophisticated methods to exploit the vulnerabilities of new fintech firms, launching international attacks that take advantage of structural weaknesses within these organisations.

These problems are primarily rooted in the centralised nature of these entities, which can make them more susceptible to large-scale breaches and systemic issues.



Topoi is dedicated to addressing the security challenges faced by neobanks. Based on a fully decentralised model, we ensure that our customers maintain complete control over their financial and personal data. Unlike traditional centralised systems, our decentralised architecture guarantees that sensitive information is never stored, effectively eliminating the risk of data breaches, frauds and compliance issues.

Our mission is to revolutionise the financial landscape by offering unparalleled flexibility and autonomy.

We employ cutting-edge technologies such as artificial intelligence (AI), next generation blockchain technology, and open banking APIs to empower our customers with greater control over their financial affairs. Our services are designed to be faster and more cost-effective than those of traditional banks, while providing more independence and flexibility than that offered by neobanks. By harnessing the combined power of these advanced technologies, we aim to introduce a new era in financial services, where customers can enjoy enhanced security, reduced costs, and increased autonomy. Our commitment is to create a financial ecosystem that not only meets but exceeds the expectations of modern consumers, paving the way for a more secure and user-centric experience.

The advantages Topoi offers in comparison:

Convenience

Topoi offers a seamless digital experience through mobile DApps and online platforms, allowing users to manage their finances anytime, anywhere, without the need to visit physical branches.

Accessibility

Topoi has no barriers to entry, with the easy installation of our DApps and creation of digital wallets that can be undertaken entirely online. This accessibility makes Topoi attractive to individuals who may not have access to traditional banking services.

Lower Fees

Topoi offers lower fees compared to traditional banks and neobanks, including no monthly maintenance fees and reduced foreign transaction fees. This can result in cost savings for users, especially frequent travellers or those with limited funds.

Innovative Features

Topoi gives access to innovative features and tools, such as real-time transaction notifications, budgeting and expense tracking tools, automated savings features, and customisable DApp settings. These features enhance user experience and help users manage their finances more effectively.

Personalisation

Topoi utilises technology and data analytics to offer personalised financial insights and recommendations tailored to each user's financial goals and spending habits. This personalised approach can help users make more informed financial decisions and achieve their financial objectives.

Fast and Flexible Services

Topoi prioritises speed and agility, offering a faster sign-up process. We are proud to offer the fastest and most scalable transaction processing solutions and flexible services tailored to the needs of modern consumers and businesses.

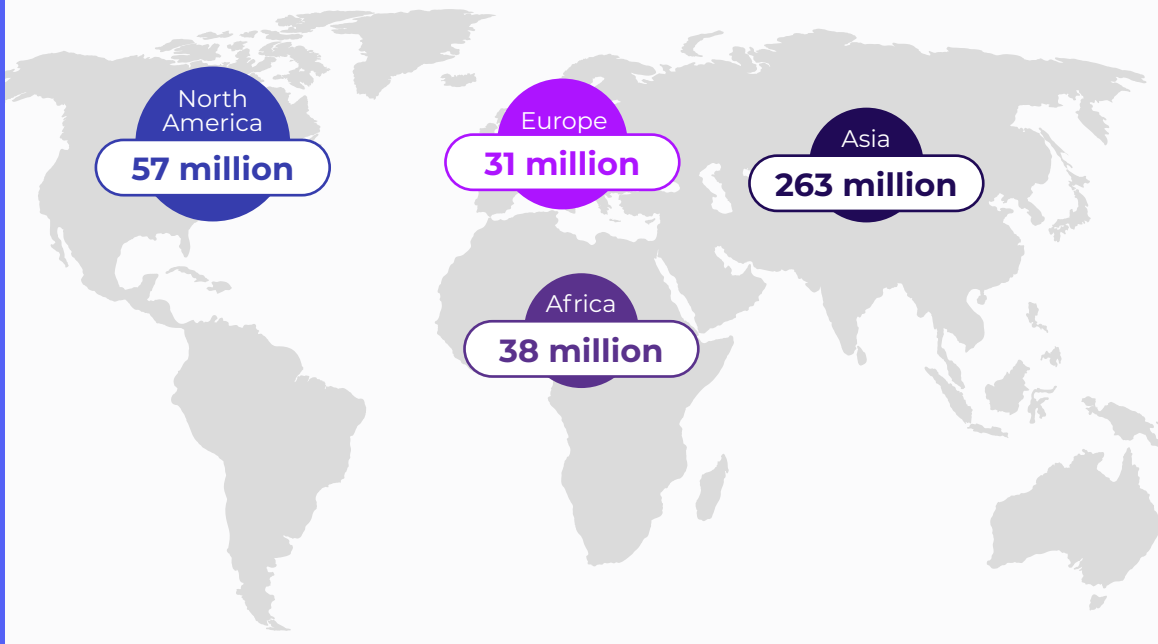
Integration with Fintech Services

Topoi partners with the best Fintech companies holding banking licenses.

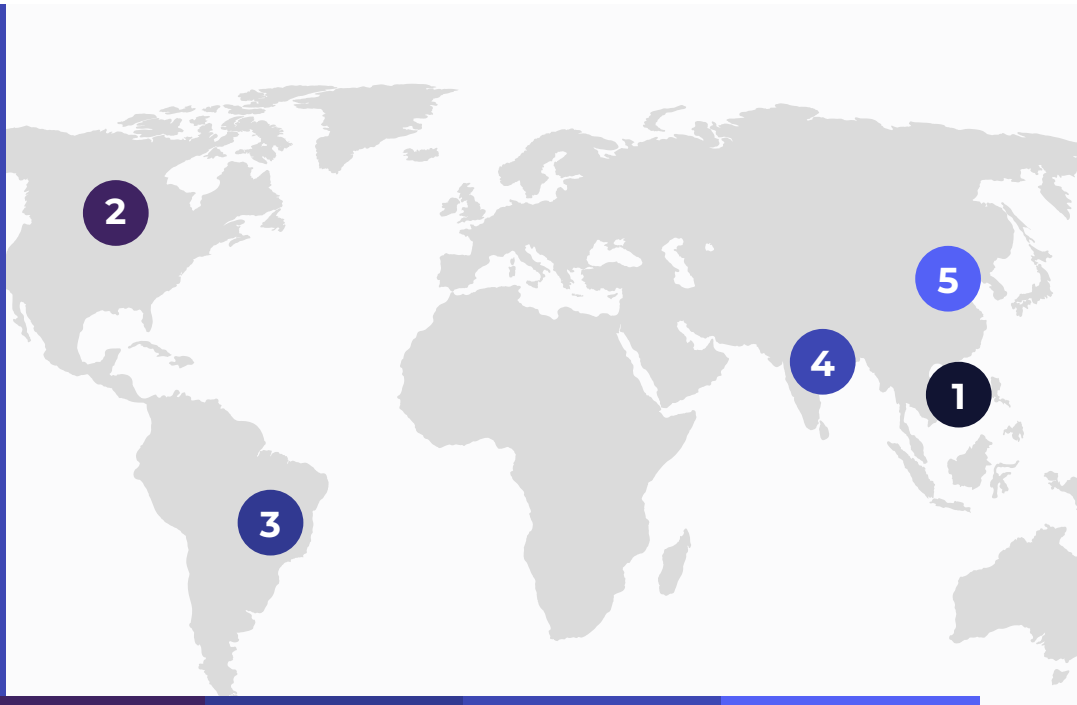
Crypto Market — Statistics

Crypto Global Adoption

Number of crypto users per region in the world



Top 5 countries with the highest cryptocurrency adoption



1. Vietnam	2. USA	3. Brazil	4. India	5. China
Total Population	Total Population	Total Population	Total Population	Total Population
98.8 million	**339.9 million**	**216.4 million**	**1.428 billion**	**1.425 billion**
No of Crypto owners	No of Crypto owners	No of Crypto owners	No of Crypto owners	No of Crypto owners
20,945,706	**52,888,108**	**25,955,176**	**93,537,015**	**59,134,683**
% of Population	% of Population	% of Population	% of Population	% of Population
21.19%	**15.56%**	**11.99%**	**6.55%**	**4.15%**

These 5 top countries are followed by 20 other countries with fast crypto adoption: Pakistan, Philippines, Nigeria, Indonesia, Russia, Mexico, Thailand, Japan, Turkey, Argentina, Bangladesh, the United Kingdom, Ukraine, Canada and Morocco.

Surveys found that between 2017 and 2021, around 200 million people worldwide started using cryptocurrencies as a payment method or a long-term investment. Furthermore, the number of crypto users increased by 7% year-over-year, in 2022, reaching 257 million people worldwide.

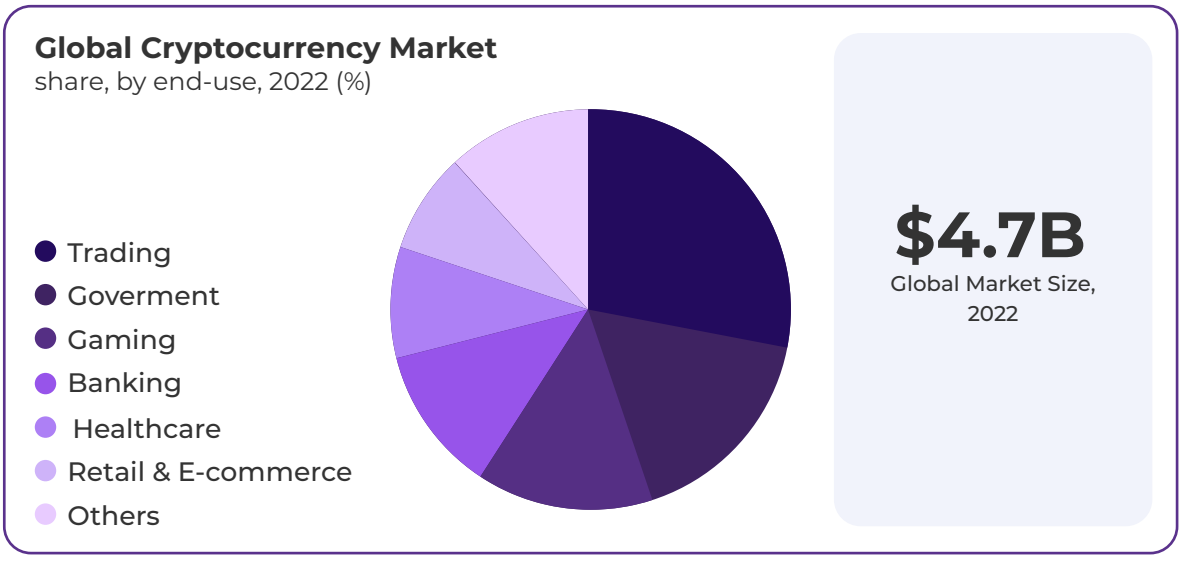
As of 2024, there are **over 575 million** cryptocurrency users worldwide. This number has been steadily increasing over the decade, with a significant growth rate in recent years, this number could escalate to between 850 and 950 million. This growth could easily be reached if current bullish market conditions continued through 2024 towards 2025.

Global cryptocurrency ownership increased by 34% in 2023 alone. Out of the 575 million people who bought cryptocurrency in 2024, Ethereum ownership increased by 39%, while a 33% increase was attributed to Bitcoin users.

In March 2024, Bitcoin surged to a historic milestone after reaching a new all-time-high, surpassing the $70,000 mark and solidifying its position as the leading cryptocurrency. This significant achievement underscores the accelerated adoption of Bitcoin and validates its status as a legitimate asset class. Moreover, the striking increase in transaction volume underscores the unwavering confidence of cryptocurrency enthusiasts in Bitcoin's role as a reliable hedge against inflation.

The notable surge in growth can be attributed to several primary factors. Firstly, the emergence of Bitcoin exchange-traded funds (ETFs) has played a pivotal role, providing investors with easier access to Bitcoin investment opportunities. Additionally, the implementation of Bitcoin Ordinals protocols has facilitated the seamless creation of both fungible and non-fungible tokens (NFTs) on the Bitcoin network, further expanding its utility and appeal.

Furthermore, the heightened interest from institutional investors has contributed significantly to the increasing popularity and adoption of cryptocurrencies. While characterised by significant volatility, the crypto market remains a high-growth sector, bolstered by ongoing technological advancements. Leading companies driving innovation in this space include Coinbase Global Inc. (NASDAQ: COIN), PayPal Holdings, Inc. (NASDAQ: PYPL), and CME Group Inc. (NASDAQ: CME).



Global Market Cap

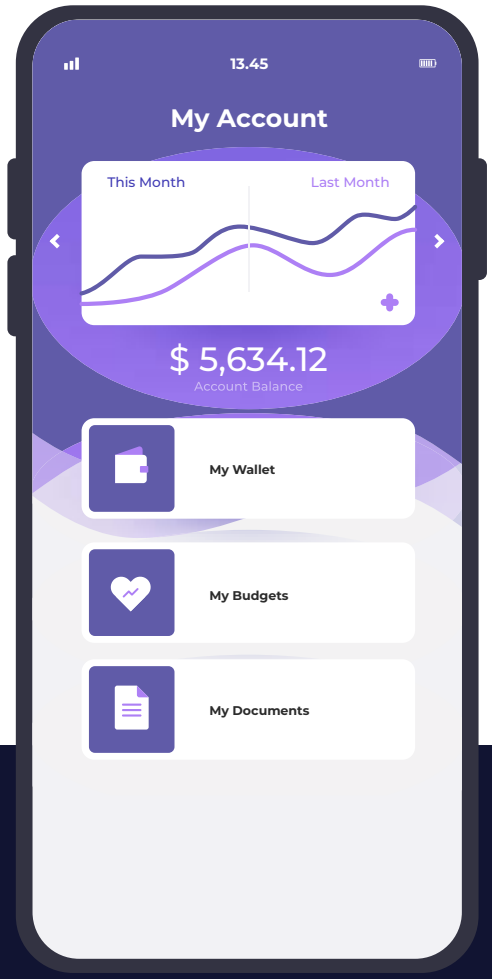
The global crypto market cap is
$2.35 Trillion
as of May 2024.

By 2030, the worldwide market is expected to grow by 12.5% in compound annual growth rate (CAGR)

Transactions

Bitcoin has reached a significant milestone, processing its **1 billionth transaction**. This achievement marks a major landmark in the 15-year history of the network, which was launched in 2008. The one billionth transaction was confirmed in block 842,241 at 9:34 pm UTC on May 5, 2024.

This milestone is a testament to the enduring value and widespread adoption of Bitcoin, as well as its capacity to process a large number of transactions daily. According to Clark Moody's Bitcoin dashboard, the network has processed an average of **178,457 transactions** daily since its inception.



The growing demand for interoperability solutions in the crypto industry: statistics

The blockchain interoperability solutions market is expected to see substantial growth in the foreseeable future. According to a recent report, the global market size for blockchain interoperability is forecasted to surge from USD 275.5 million in 2022 to USD 2.88 billion by 2032, reflecting a Compound Annual Growth Rate (CAGR) of 26.8% during the projection period.

In terms of market expansion, it is anticipated that the blockchain interoperability market will attain USD 1.0 billion by 2028, registering a CAGR of 27.2% throughout the forecast period. This growth trajectory is attributed to escalating demands for streamlined communication and asset transfer among diverse blockchain networks, the escalating adoption of DApps, and the emergence of a varied range of blockchain ecosystems, necessitating interoperability to facilitate collaboration and broaden access to resources.

Furthermore, market growth is fuelled by the increasing integration of blockchain technology not only in finance but also across various sectors including healthcare, and supply chain management. The adoption of blockchain interoperability solutions enables seamless data and asset transfer across disparate blockchain networks, which is anticipated to propel market expansion. Segment-wise, the blockchain interoperability market is segmented into solutions, applications, and verticals.

The solutions segment encompasses cross-chain bridging, cross-chain APIs, and federated or consortium interoperability. The applications segment covers DApps, digital assets/NFTs, and cross-chain trading & exchange, while the verticals segment includes finance, healthcare, and supply chain management.

4 Blockchain and Interoperability: Key to Mass Adoption

The importance of interoperability in the Topoi blockchain ecosystem.

Cross-chain bridges are essential components in the financial landscape, acting as conduits that connect traditional financial systems with the growing crypto ecosystem.

Functionally, cross-chain bridges link the protocols and standards of various blockchain networks, enabling secure asset transfers across platforms. This allows assets from traditional financial systems, like fiat currencies or securities, to be tokenised and moved onto blockchain networks, where they can be traded, exchanged, or used within DApps.

Conversely, digital assets native to blockchain networks can be bridged back into traditional financial systems, integrating them into existing financial infrastructures and investment vehicles. This interoperability fosters new opportunities for liquidity, investment, and innovation, allowing assets to flow unhindered.

Currently, there is a significant gap in the market for a solution that delivers a blockchain that is at the same time fully decentralised, interoperable, modular and highly scalable. Existing projects have yet to provide a blockchain capable of handling very high transaction volumes while guaranteeing truly secure, instant payments that bridge both crypto and fiat currencies.

Topoi aims at facilitating asset transfer between traditional financial systems and the crypto ecosystem by implementing multiple interoperability solutions:

- The Topoi Virtual Machine (TVM) fully EVM compatible
- Set of APIs communicating between DApps and nodes through Web3
- Development of Cross-Chain Bridges
- Message Bus enhancing interoperability between systems
- HTTP Rest API

The challenges and limitations of existing cross-chain solutions

While cross-chain solutions have made significant strides in enabling interoperability between different blockchain networks, they still face several limitations that can impact their effectiveness and adoption. Some of the key limitations include:

Complexity
Many existing cross-chain solutions are complex and technically challenging to implement, requiring extensive development expertise and specialised knowledge of blockchain protocols. This complexity can hinder adoption among users, businesses and developers who lack the necessary resources and expertise to integrate cross-chain functionality into their applications.

Scalability
Scalability remains a significant challenge for cross-chain solutions, particularly as blockchain networks continue to grow in size and transaction volume. Current cross-chain protocols may struggle to handle the increasing demand for cross-chain transactions, leading to congestion, delays, and reduced performance.

Security Risks
Cross-chain solutions introduce new security risks and attack vectors that can compromise the integrity and security of blockchain networks. Vulnerabilities such as double-spending attacks, asset theft, and protocol exploits can undermine trust and confidence in cross-chain solutions, posing significant risks to users and businesses.

Centralisation Pressures
Some cross-chain solutions may face centralisation pressures, particularly if they rely on centralised intermediaries or trusted validators to facilitate cross-chain transactions. Centralisation can undermine the decentralisation goals of blockchain networks and introduce single points of failure that are susceptible to manipulation or censorship.

Interoperability Standards
The lack of interoperability standards and protocols can hinder the straightforward integration of cross-chain solutions with existing blockchain networks and applications. Without standardised interoperability frameworks, developers may encounter compatibility issues and technical challenges when attempting to connect different blockchain networks.

Regulatory Uncertainty
Cross-chain solutions may face regulatory uncertainty and compliance challenges, particularly in jurisdictions with strict regulations or unclear legal frameworks for blockchain technology. Regulatory concerns related to AML, KYC, and securities laws can limit the adoption and growth of cross-chain solutions, particularly in regulated industries such as finance and healthcare.

Economic Incentives
Economic incentives play a crucial role in the adoption and sustainability of cross-chain solutions. Current models for incentivising validators, liquidity providers, and users may be insufficient or poorly aligned with the needs of the ecosystem, leading to liquidity shortages, network congestion, and inefficiencies.

Addressing these limitations will require ongoing research, innovation, and collaboration within the blockchain community to develop robust, scalable, and secure cross-chain solutions that can meet the evolving needs of users, businesses, and regulators.

By proactively confronting these obstacles, Topoi solidifies its position as a strong and reliable presence within the industry. We take immense pride in our ability to deliver the most sophisticated technology based on a new generation modular ZK blockchain that not only addresses the challenges at hand, but also paves the way for a future characterised by enhanced interoperability, seamless collaboration, and boundless innovation across diverse blockchain networks and ecosystems.

Topoi's Interoperability with Ethereum

The Topoi Virtual Machine (TVM) is fully compatible with the Ethereum Virtual Machine (EVM). We implement a word code instruction set compiled from high-level languages like Solidity and Vyper. Ethereum Bytecode has proven efficient, but is now facing limitations due to the finite number of 255 opcodes available.

By upgrading to a 16-bit code base architecture and introducing word code, our TVM will not only enhance the performance and efficiency of smart contract execution, but also ensure that it remains scalable and adaptable to future advancements in blockchain technology. This approach will provide developers with the tools they need to create more complex and powerful DApps, ultimately driving innovation and growth within the ecosystem. Topoi integrates both Bitcoin and Ethereum Hashes in our word code instruction set for the TVM.

Why the EVM compatibility of the TVM is truly important:

Development Activity	DApps and Usage	Users and Transactions
Ethereum has one of the largest developer communities in the blockchain space, with thousands of active developers. GitHub repositories related to Ethereum, Solidity, and various DApp projects see continuous contributions and activity.	As of 2024, there are thousands of DApps deployed on Ethereum, covering a wide array of use cases such as finance, gaming, identity, NFTs, and supply chains.	The Ethereum network processes slightly above a million transactions daily, with a substantial number of active addresses interacting with the blockchain regularly. Tools like Etherscan provide metrics on transaction volumes and active addresses, highlighting the extensive usage of the EVM.

The EVM community on Ethereum is extensive and diverse, comprising developers, businesses, end-users, investors, validators, researchers, academics and many other participants. Our goal with Topoi is to provide this dynamic community with a fully EVM-compatible and operational TVM, enabling us to reach EVM users and collaboratively drive development towards the mass adoption of crypto and blockchain technology. Ethereum's prominence as one of the most significant blockchain platforms globally underscores the importance of this initiative.

Our target audience spans individual developers and small start-ups to large enterprises and institutional investors, demonstrating the broad appeal and utility of the Ethereum ecosystem. By offering a virtual machine that flawlessly integrates with the EVM, Topoi aims to unlock substantial benefits, fostering decentralised interoperability within the ecosystem. This effort will enhance the overall capabilities of the network and support its continued growth and success in the blockchain space.

5 Open Banking API

Topoi and Open Banking API

With Open Banking APIs, Topoi is revolutionising the way financial data and services are accessed and managed. Our partnership with the best banking-licensed fintech companies allows us to provide secure, transparent, and scalable financial solutions for both individuals and businesses. This ensures that all financial transactions and data exchanges comply with relevant regulations.

As we operate on a decentralised model, our customers retain full control over their financial data. Our decentralised architecture ensures that sensitive information is never stored on any of our central servers, removing the risk of data breaches.

Our APIs follow industry-standard protocols, ensuring compatibility and frictionless integration with a wide variety of financial institutions. Users can view all their transactions in one place using the Topoi DApps, regardless of which bank or financial institution they use. We provide services that are faster and more cost-effective than traditional banks, and with greater independence and flexibility compared to neobanks.

Our platform (Topoi DApps) is designed with the user in mind, offering intuitive interfaces, personalised features, and comprehensive support to meet the unique needs of individuals and businesses alike. Additionally, we aim to include the unbanked, offering them accessible financial services to ensure everyone can participate in the financial ecosystem.

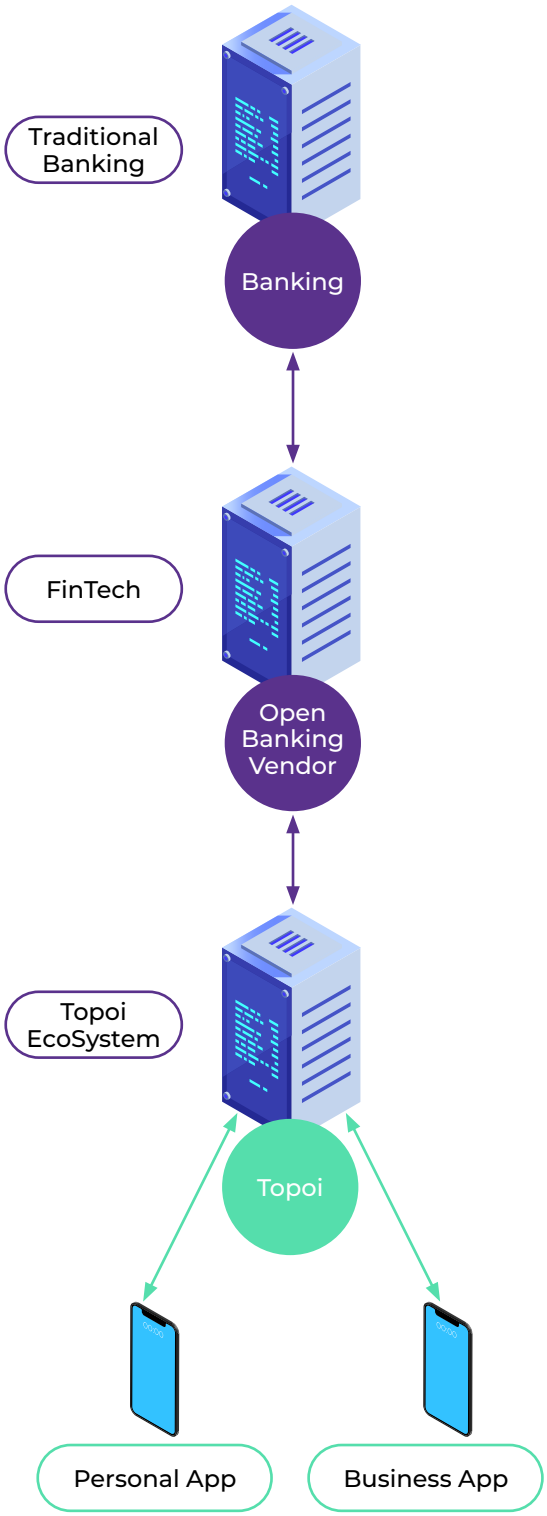


Figure 1

Topoi Open Banking API — Personal

Multicurrency Transactions

Foreign Currency Transfers: Send and receive money in different currencies.

Currency Conversion: Convert funds from one currency to another at competitive rates.

Multicurrency Wallets: Manage and hold balances in multiple currencies within dedicated wallets.

Variable Transfers

Direct Debits: Authorise third parties to collect payments directly from your account on a recurring basis.

Standing Orders: Set up regular payments to be sent to a specified account at fixed intervals.

Recurring Payments: Schedule automatic payments for subscriptions, utilities, or other services on a regular basis.

Transfers from Our User's Account to Another User's Account

Internal Transfers: Move funds between different wallets within our system.

Bank to Bank One-Off Transfers

Domestic Transfers: Send funds from one bank account to another within the same country.

International Transfers: Transfer money across borders to bank accounts worldwide.

Bank to Topoi Transfers

Funding Your Topoi Wallet: Transfer money from your bank account to fund your wallet on our platform.

One-Time Deposits: Make one-off deposits to your Topoi Wallet for specific transactions or investments.

Real-Time Analytics

Our Topoi DApps provides a real-time insight into spending patterns, allowing users to set financial goals, track expenses, categorise transactions, and receive personalised alerts.

These diverse transaction types offered through Topoi Open Banking APIs ensure that individuals have the flexibility and convenience to manage their finances effectively and efficiently.

Topoi Open Banking API — Businesses and Corporates

Multicurrency and International Transfers

Foreign Currency Transfers: Facilitate sending and receiving funds in multiple currencies.

Currency Conversion: Convert funds between different currencies at competitive rates.

International Payments: Handle cross-border payments effortlessly.

Spending Management Tools

Expense Tracking: Monitor and categorise business expenses in real-time.

Spending Limits: Set and enforce spending limits for different departments or teams.

Receipt Management: Upload and manage receipts for expenses.

Budgeting and Analytic Tools

Budget Planning: Create and track budgets for various business activities.

Financial Analytics: Detailed reports and analytics on income, expenses, and profitability.

KPI Tracking: Monitor key performance indicators relevant to financial health.

Commercial Variable Recurring Payments (VRP)

Automated Payments: Set up and manage automated payments for regular transactions.

Subscription Management: Handle recurring billing for subscription services.

Treasury Management Tools

Cash Flow Analysis: Monitor and forecast cash flow to ensure liquidity.

Investment Management: Manage and optimise short-term investments and cash reserves.

Risk Management: Tools to manage currency risk, interest rate risk, and other financial risks.

Refunds and Partial Refunds

Transaction Reversals: Process full or partial refunds for transactions.

Automated Refund Management: Streamline and automate the refund process for customer satisfaction.

Payment Link

Generate Payment Links: Create and share payment links for customers to complete transactions.

Customisable Links: Personalise payment links for different products or services.

Plugins Compatible with E-commerce Platforms

E-commerce Integration: Seamless integration with popular e-commerce platforms to facilitate payments.

Marketplace Plugins: Specialised plugins for Shopify, nopCommerce and alike to enhance payment capabilities and customer experience.

Customisable Checkout: Tools to customise the checkout process to align with business needs.

Payment Gateway

Online Payments: Facilitate secure online payments for goods and services.

Multiple Payment Methods: Support for various payment methods, including credit cards, debit cards, and digital wallets.

Fraud Detection: Integrated tools to detect and prevent fraudulent transactions.

These diverse transactions and services provided through the Topoi DApps with Open Banking API empower businesses and corporates to manage their financial operations efficiently, optimise cash flow, and enhance customer experiences.

6 The Topoi Public Blockchain

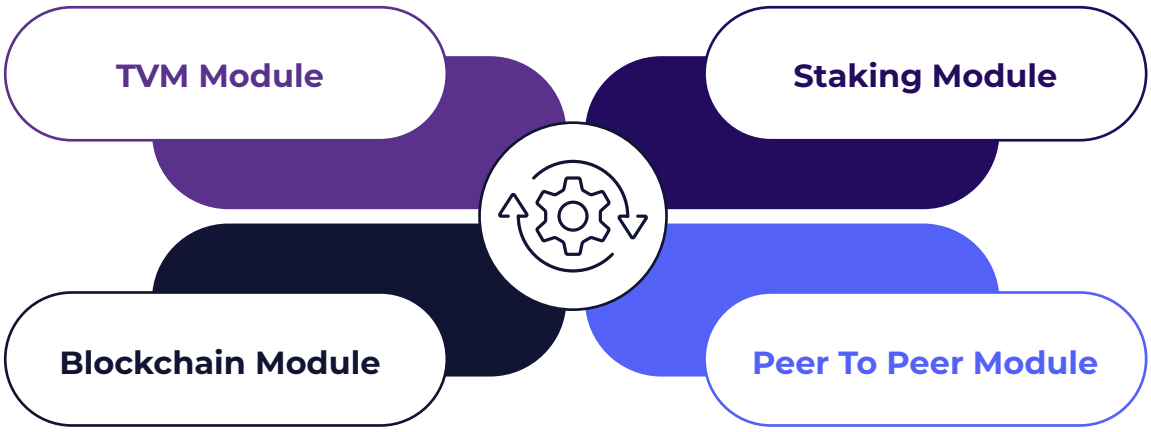


Figure 2

The Topoi Virtual Machine

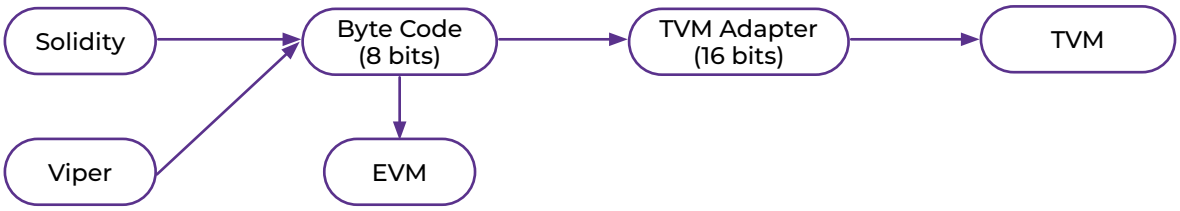


Figure 3

Topoi is dedicated to enhancing performance, efficiency, and overall capability by offering a virtual machine (TVM) that operates on 16-bit word code base architecture instead of the traditional 8-bit byte code base system, which allows for a maximum of 65,535 opcodes. This transition will significantly improve the machine's ability to handle complex cryptographic operations, manage larger transactions sets more effectively and allow more sophisticated functionalities.

The TVM is a crucial component of the Topoi blockchain. It serves as the runtime environment for our smart contracts and is responsible for executing them. The TVM's functions are as follows:

Execution of Smart Contracts

Smart Contract Platform

The TVM allows developers to deploy and run smart contracts on the Topoi blockchain. These are self-executing contracts where the terms of the agreement or conditions are directly written into code.

Deterministic Execution

The TVM ensures that the execution of smart contracts is deterministic, meaning that given the same input, it will always produce the same output. This is essential for the consistency and reliability of transactions on the blockchain.

Immutability of Topoi Smart Contracts

When a smart contract is deployed on the Topoi blockchain, the contract's code is stored on the blockchain at a specific address. This code becomes part of the blockchain's immutable ledger, which means it cannot be changed or deleted.

The immutability of smart contracts is ensured by the underlying blockchain technology, which relies on a decentralised network of nodes that maintain and validate the blockchain's state. Any attempt to alter the deployed code would be rejected by the consensus mechanism.

Users can trust that the smart contract will execute exactly as written, without the risk of tampering. This is especially important for financial transactions and applications where trust is paramount.

The contract's code can be audited and verified by anyone, ensuring transparency and enabling thorough security reviews.

Topoi tokens are implemented as smart contracts that define the rules and behaviour of the token. Once deployed, these rules cannot be changed.

Smart contract code and data are stored on the Topoi blockchain. This storage is replicated across all nodes on the network, ensuring that the contract's state is consistently maintained and immutable.

The immutability is secured once a block confirmation has been achieved.

Isolation and Security

Sandbox Environment

The TVM acts as a sandboxed environment for executing smart contract code. This isolation ensures that code running within the TVM does not affect the host system and prevents potentially malicious code from compromising the network.

Security Features

By running code in an isolated environment, the TVM helps protect against certain types of attacks and vulnerabilities that might be exploited against the underlying system.

Consensus Mechanism Support

State Transition

The TVM supports Topoi POS. Every transaction executed by the TVM updates the global state of the blockchain, which includes account balances, contract storage, and more.

Consensus Verification

Since the TVM execution is deterministic, all nodes in the Topoi network can independently verify the results of transactions. This consensus mechanism ensures that all nodes agree on the state of the blockchain.

Turing Completeness

Programmability

The TVM is Turing complete, meaning it can perform any computation given enough resources. This allows developers to create complex DApps with custom logic.

Gas Mechanism

Resource Management

The TVM uses a gas mechanism to manage computational resources. Each operation executed by the TVM requires a certain amount of gas, which is paid for by the transaction sender. This prevents abuse of computational resources and incentivises efficient code.

Gas Limit and Fees

The gas limit restricts the number of computational steps a transaction can take, ensuring that the network remains performant. Gas fees compensate validators for their computational work and help prevent spam on the network.

Hash and Blockchain

Key Characteristics of Hash Functions in Topoi

In a blockchain, a hash is a deterministic hexadecimal number. This means that no matter how many characters the input has, the hash output will always have the same length of characters. For instance, in Bitcoin, hashes are always represented as a 64-character hexadecimal number.

Hashes are used to secure information — in the case of Topoi, hashes are used to ensure data contained in the blocks on our blockchain are not altered. Topoi's smart contracts use hash functions. The block hash is calculated from all the transactions in the block.

Merkle Tree Structure

Topoi's blockchain relies on the Merkle tree structure. A Merkle tree, also known as a binary hash tree, is a data structure used to efficiently and securely verify the integrity of data on the blockchain. It is a hierarchical tree structure in which every leaf node represents the hash of a data block, and each non-leaf node is the hash of its child nodes.

The top node of the tree is called the Merkle root, which uniquely represents all the data within the tree.

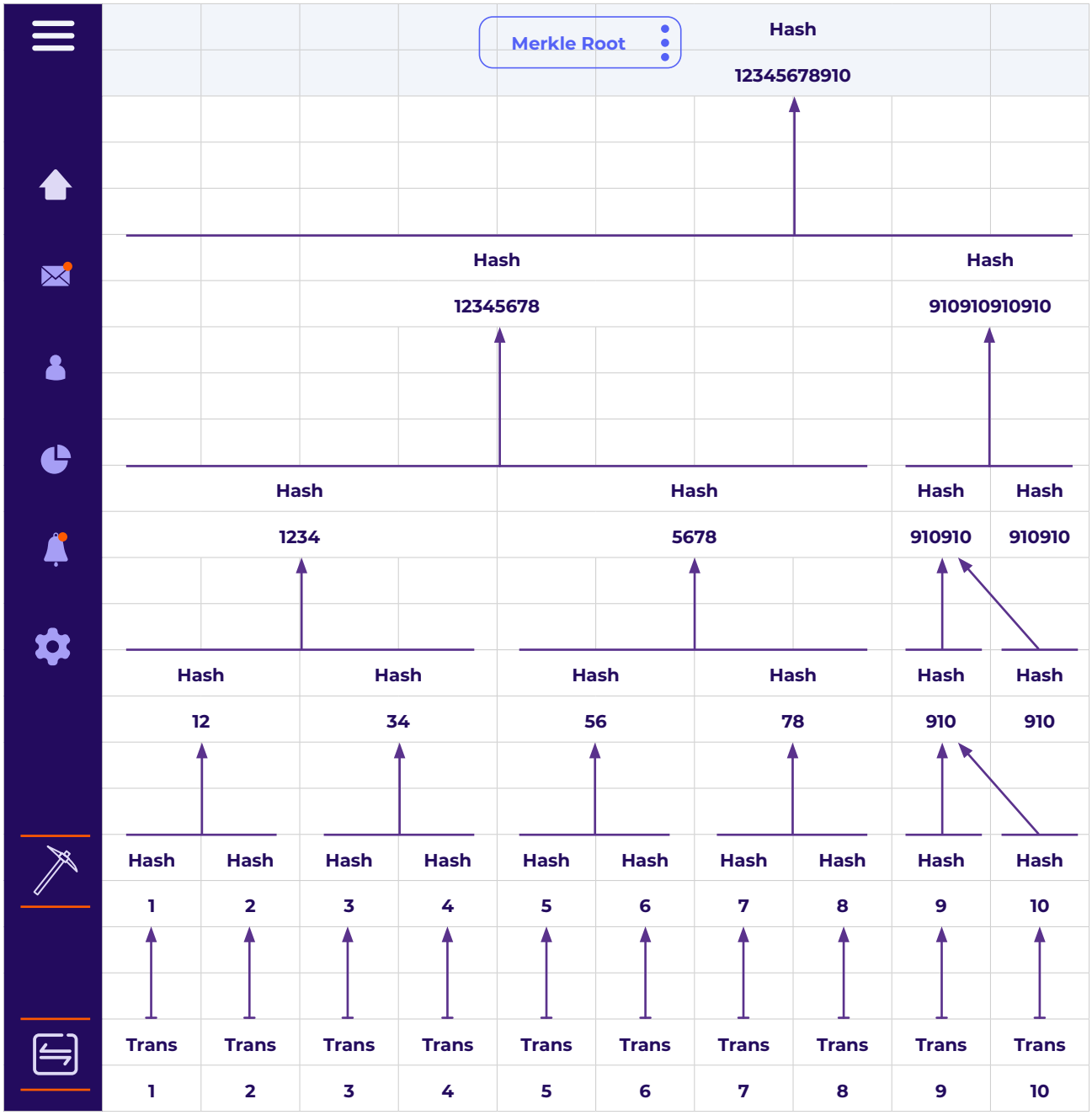


Figure 4

Structure of a Merkle Tree

Leaf Nodes

The leaf nodes are the hashes of individual data blocks (e.g., transactions).

Non-Leaf Nodes

Each non-leaf node is the hash of the concatenation of its two child nodes. This process continues up the tree.

Merkle Root

The topmost node of the tree is the Merkle root. It is obtained by repeatedly hashing pairs of nodes until only one node remains.

Why does Topoi use a Merkle Tree?

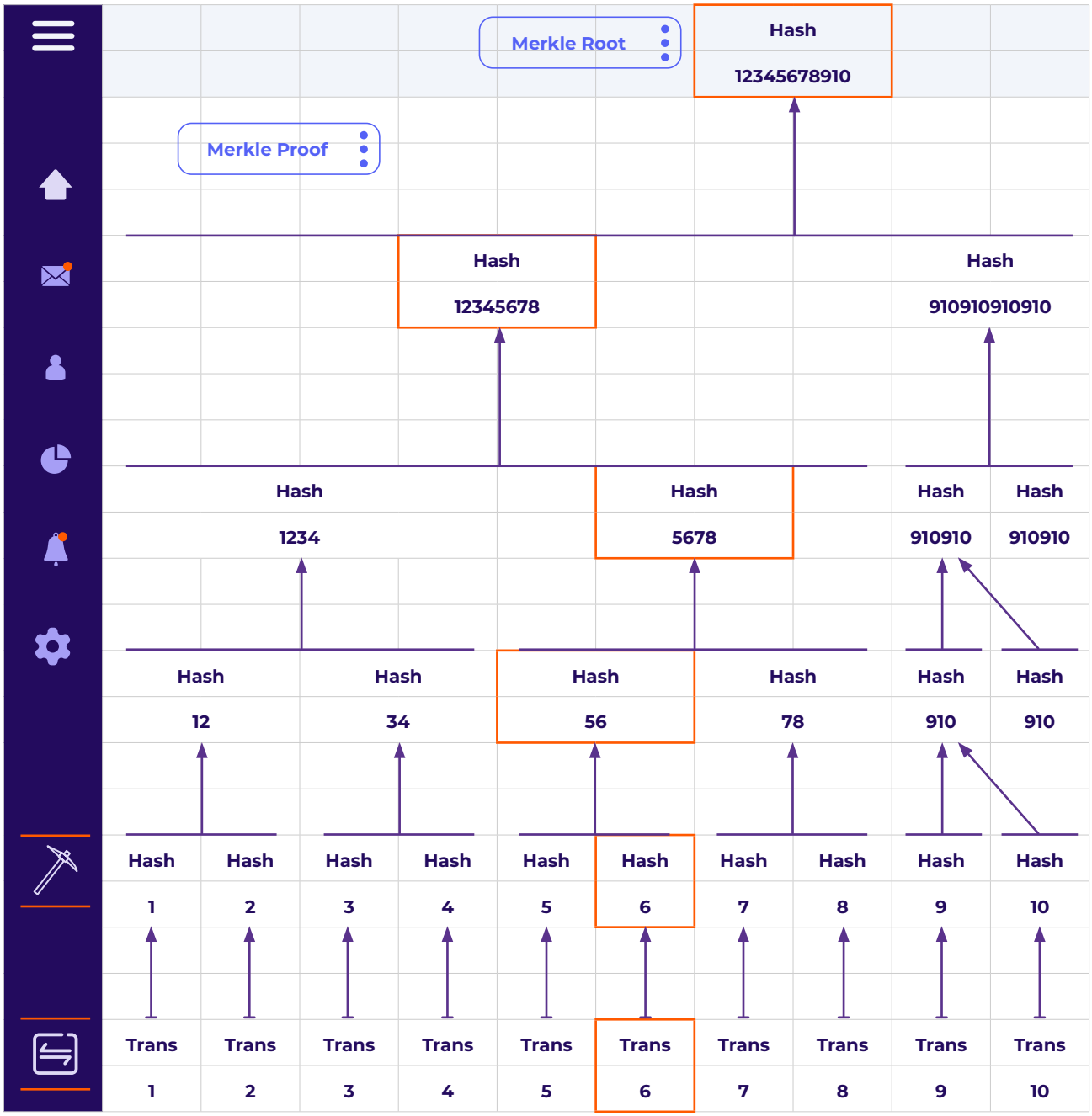


Figure 5

Merkle trees play a crucial role in the functioning of the Topoi blockchain for several reasons:

Efficient and Secure Verification	Scalability and Performance	Simplified Verification (SPV)
Data Integrity: The Merkle root in a block header provides a compact summary of all transactions in the block. If any transaction changes, the Merkle root will change, indicating data tampering. **ZK Proofs:** ZK (Zero Knowledge) proofs allow for efficient verification of the inclusion of a transaction in a block. Instead of providing all transactions, a ZK proof only requires a small subset of hashes to prove that a transaction is part of the tree.	**Reduced Bandwidth:** Nodes can verify transactions without needing to download the entire block. This is particularly useful for lightweight clients (SPV nodes) that do not store the full blockchain. **Parallel Processing:** Transactions can be hashed independently and then combined, allowing for parallel processing and faster computation of the Merkle root.	**Simplified Payment Verification (SPV):** SPV nodes can verify that a transaction is included in a block by using a Merkle proof and the block header, without needing the full blockchain. This makes the network more accessible and usable on devices with limited resources.

To summarise: A Merkle tree is a hierarchical data structure used to efficiently and securely verify data integrity. On the Topoi blockchain, it allows for compact representation and verification of transactions within a block, supports efficient and scalable network operation, and enables lightweight clients to participate in the network without needing to store or process the entire blockchain. The use of Merkle trees enhances the security, performance, and scalability of the network.

Topoi Nodes, validators and communication between systems

REST APIs and Message Bus infrastructure are two distinct approaches for enabling communication and integration between different software systems. Topoi integrates both architectural patterns to maximise the benefits of each communication method.

By defining specific endpoints and integrating REST APIs with blockchain nodes, our goal is to leverage the unique advantages of blockchain technology to build robust, innovative, and secure applications. The integration of the Message Bus, on the other hand, provides asynchronous, decoupled, and event-driven communication, making it ideal for scalable, resilient systems and microservices that require high throughput and fault tolerance.

Role of Blockchain Nodes

Nodes

Definition

A node is a participant in the Topoi blockchain network that maintains a copy of the blockchain ledger, validates transactions, and participates in the consensus mechanism.

Functions

Transaction Validation	Ledger Maintenance	Consensus Participation
Nodes validate transactions according to the Topoi blockchain protocol.	Nodes keep an up-to-date copy of the entire Topoi blockchain ledger.	All nodes participate in the consensus process to agree on the state of the Topoi blockchain.

Role of a Validator on the Topoi Blockchain

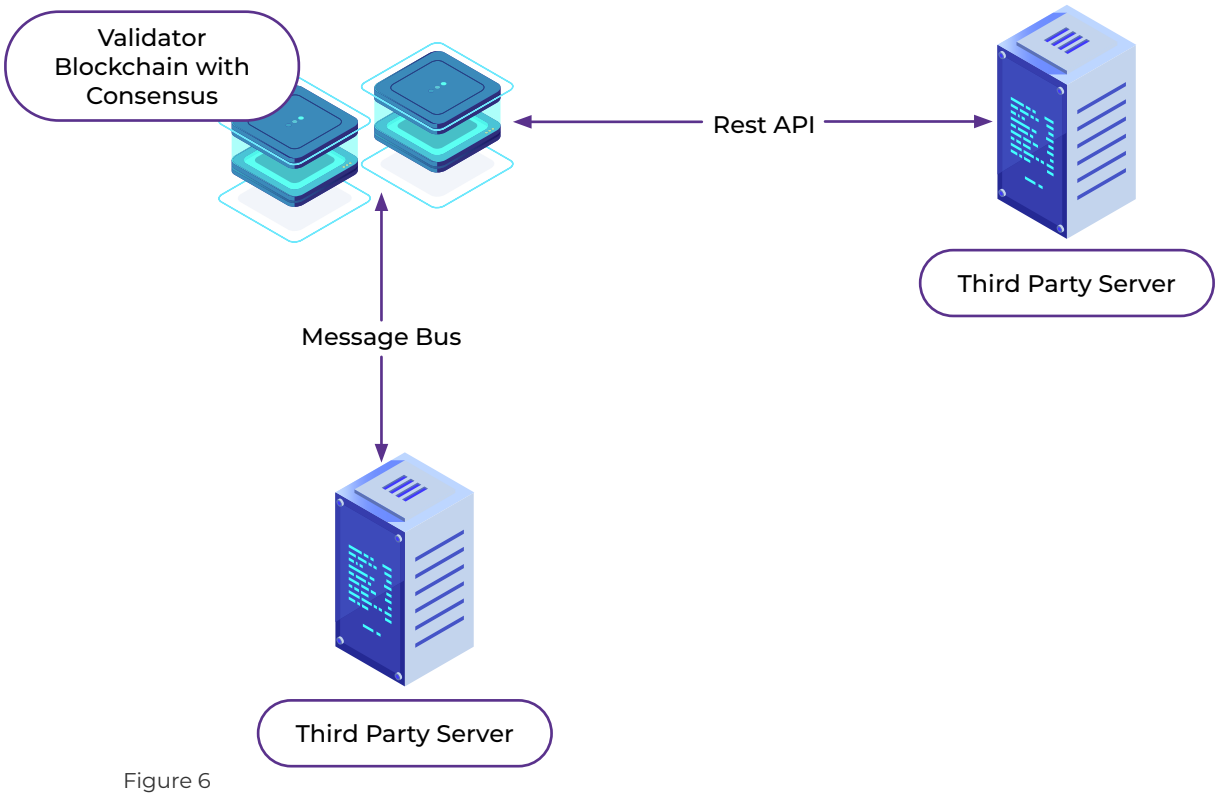


Figure 6

Validators are essential components of the Topoi blockchain network. They receive commands through the peer-to-peer module, then select transactions from the local memory pool. Validators calculate the Block Hash from the Merkle trees of all transactions, which prevents malicious activities and fraud. They contribute to the decentralisation of the network. A diverse and distributed set of validators helps avoid central points of failure and control.

Zero Knowledge for Topoi Layer 1

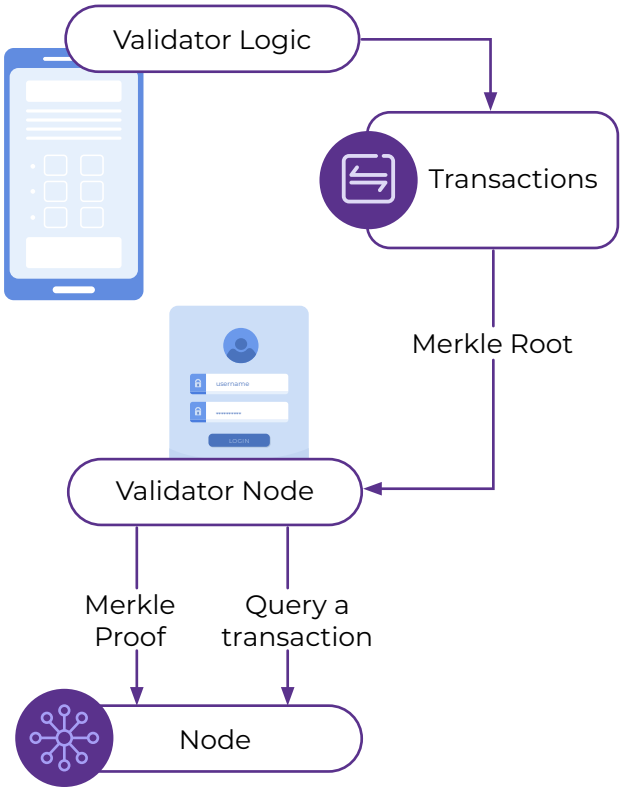


Figure 7

Here are the key features of a validator on the Topoi blockchain:

Transaction Validation

Verification
Validators verify the authenticity and correctness of transactions submitted to the blockchain. This involves checking digital signatures.

Inclusion in Blocks
After validating transactions, validators include them in new blocks that they propose to add to the blockchain.

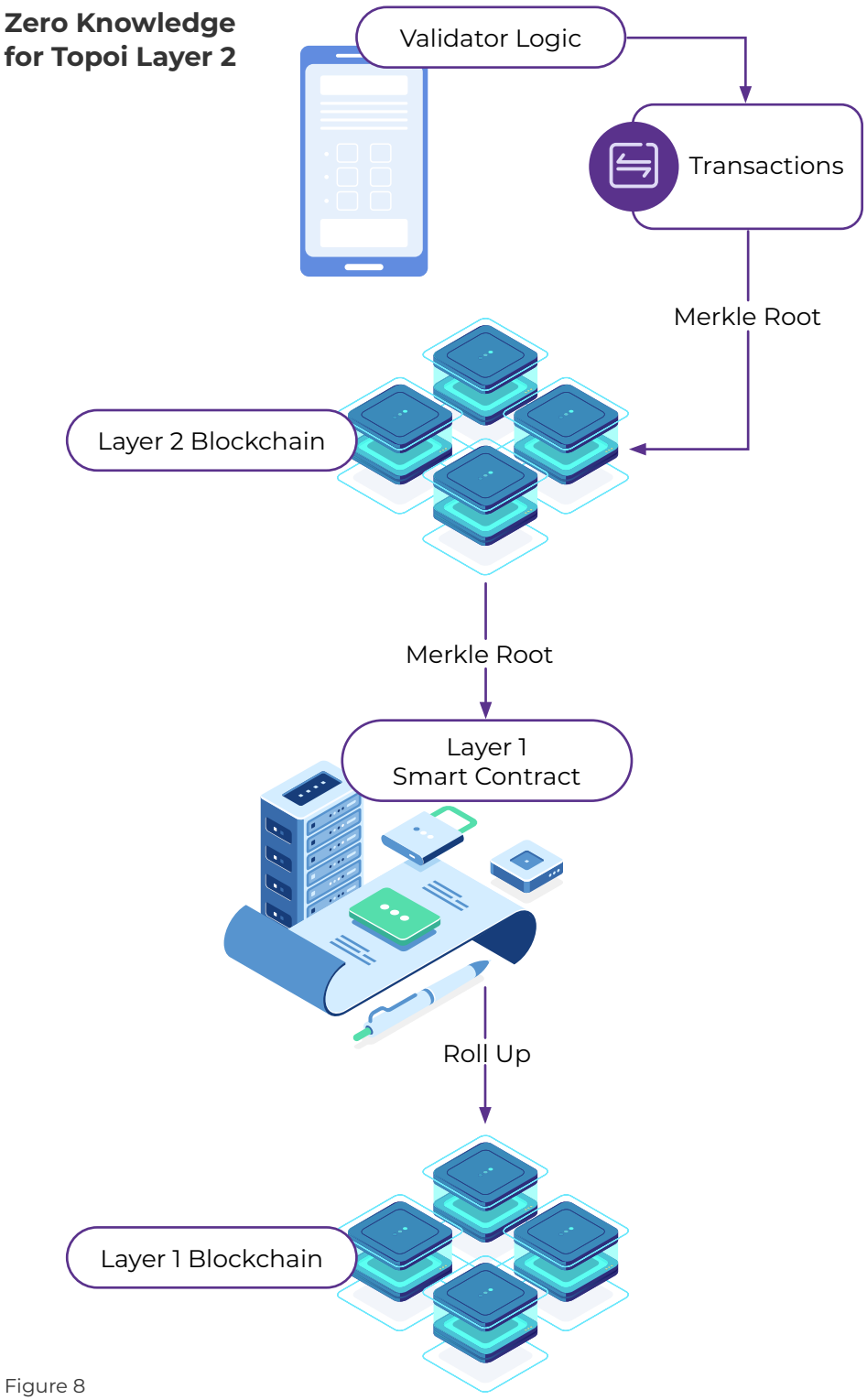


Figure 8

Consensus Participation

Consensus Mechanism
Topoi uses Proof of Stake (PoS) as the consensus mechanism for its blockchain, in which validators participate. A validator is selected each time in a non-deterministic and completely random manner.

Block Proposal and Voting
On the Topoi Blockchain, validators are responsible for proposing new blocks. The consensus mechanism ensures that the network agrees on a single chain of blocks.

Maintaining Network Security
By participating in the consensus process, validators help secure the network against attacks, such as 51% attacks.

Maintaining the Ledger

Block Addition
Once a block is validated and agreed upon through the consensus process, validators add the block to their copy of the blockchain ledger.

Ledger Synchronisation
Validators ensure that their ledger is synchronised with the rest of the network, maintaining a consistent and up-to-date record of all transactions.

Staking and Incentives

Staking
With the Topoi PoS, validators are required to stake a certain amount of Topoi tokens as collateral in order to participate. This stake acts as an economic incentive to behave honestly, as malicious actions can result in a loss of staked funds. The amount of staked tokens does not affect the algorithm responsible for choosing each validator.

Rewards
Validators receive a certain amount of Topoi tokens as a block reward for their work and transaction fees from the transactions they validate. This provides an incentive for validators to participate actively and honestly in the network. The Topoi Foundation receives a percentage of the transaction fees.

Slashing
However, a validator who acts against the rules will forfeit both their staked funds and any transaction fee rewards. After three instances of misconduct, a validator will be permanently banned from the network.

Uptime and Performance
Validators are expected to maintain high uptime and performance, ensuring that they are always available to validate transactions and participate in the consensus process.

Network Stability
By maintaining reliable operations, validators contribute to the overall stability and reliability of the blockchain network.

Node Maintenance

Validators need to maintain their nodes, by the broadcasting of each new block to other nodes through the peer-to-peer module. This process ensures they are secure, up to date with the latest software, and protected against potential attacks.

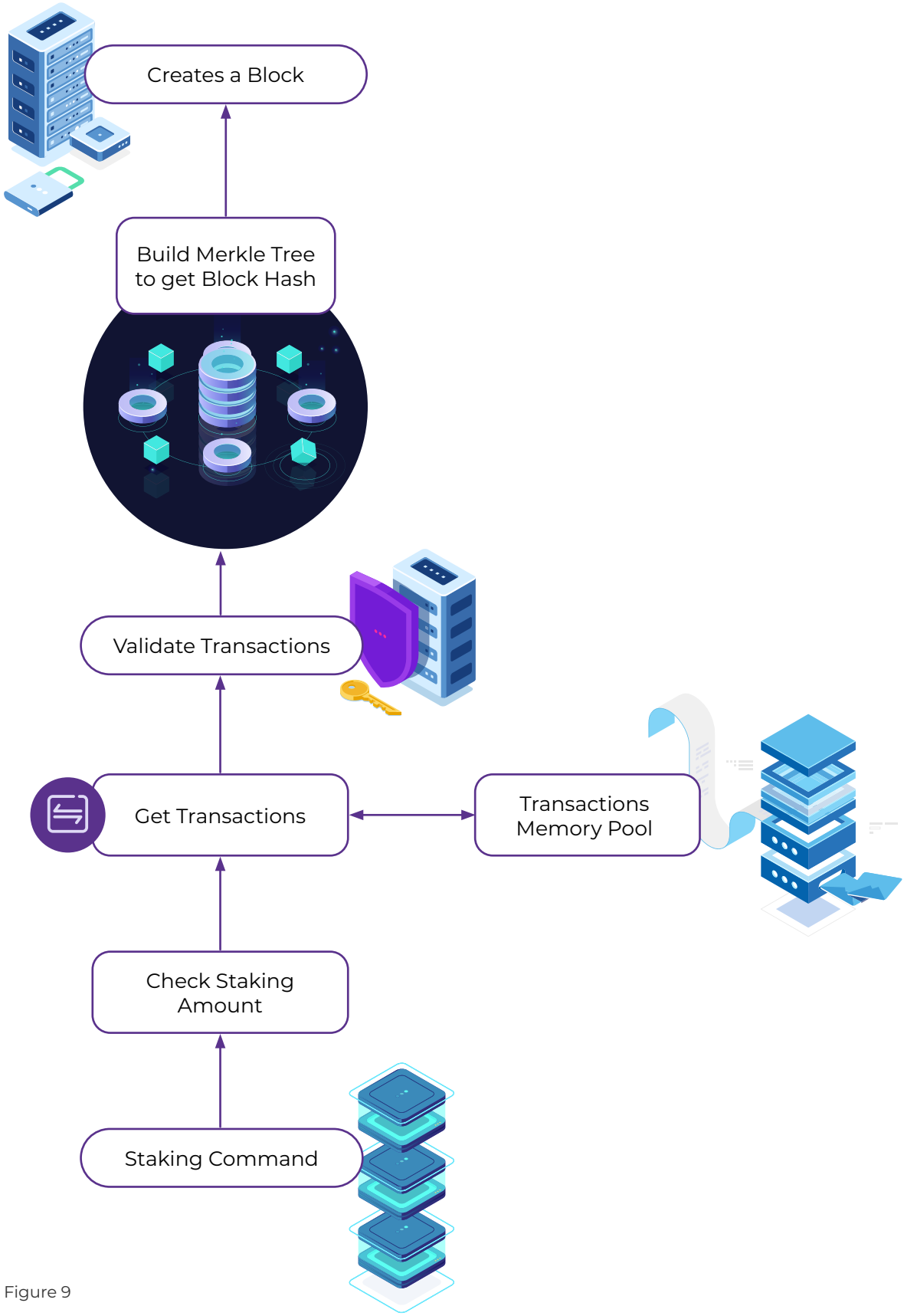


Figure 9

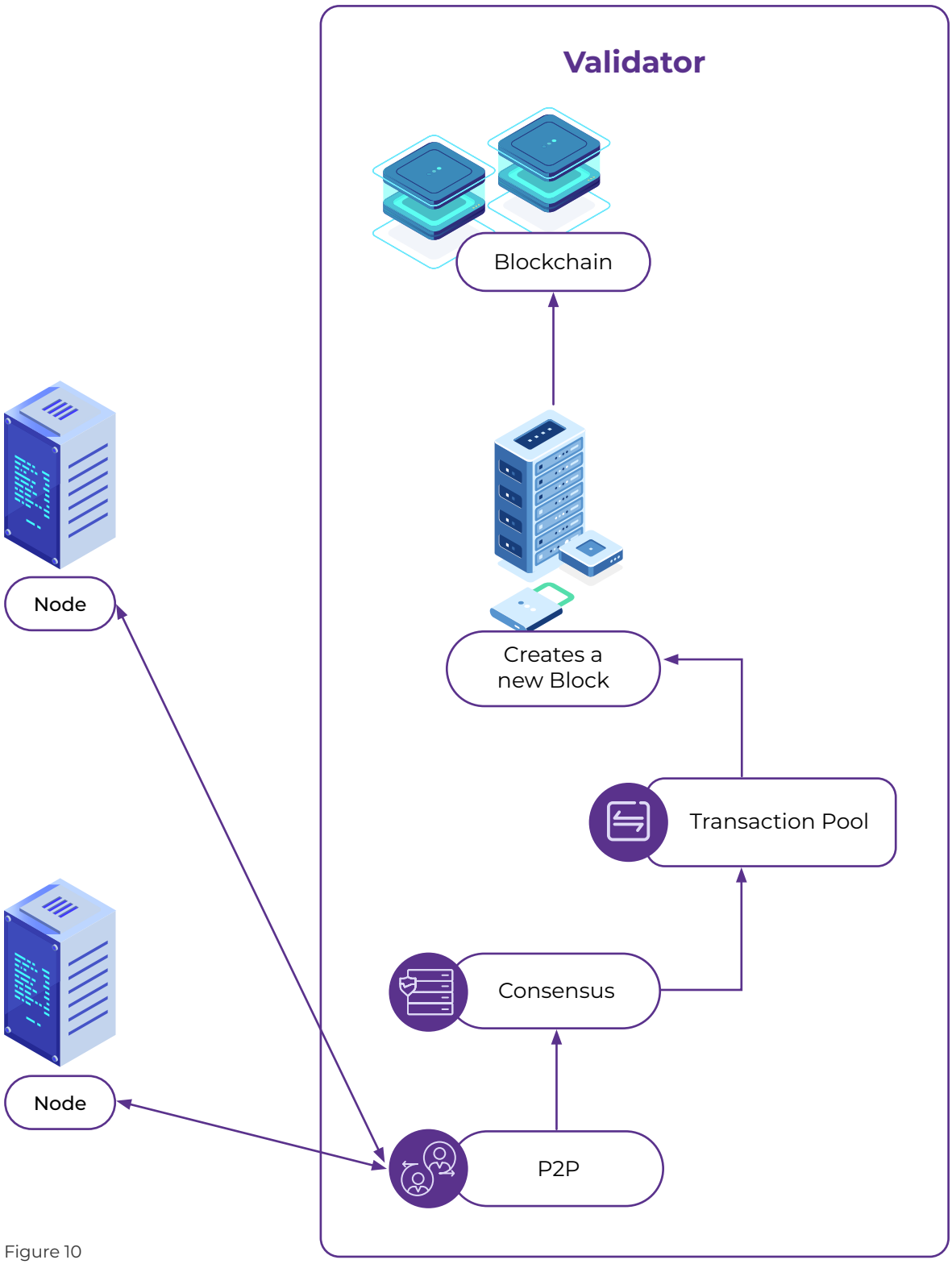

Validator
Blockchain
Node
Creates a
new Block
Transaction Pool
Node
Consensus
P2P

Figure 10

Role of REST APIs

REST APIs

Definition

REST APIs (Representational State Transfer Application Programming Interfaces) provide a standardised way for third party applications to interact with Topoi Nodes using HTTP methods.

Functions

Access and Manipulation	Integration
REST APIs allow applications to access and manipulate resources via HTTP and HTTPS requests.	They facilitate integration between different systems by providing a common interface for communication.

Benefits of Using REST APIs with Blockchain Nodes

Ease of Use

Developer-Friendly: REST APIs are familiar to most developers, making it easier to build and integrate blockchain-based applications.
Standardisation: Using REST APIs standardises the way applications interact with blockchain nodes, promoting consistency and interoperability.

Security and Access Control

Controlled Access: REST APIs can implement authentication and authorisation mechanisms to control access to blockchain data and operations.
Data Protection: By using HTTPS, REST APIs ensure that data transmitted between the client and the blockchain node is encrypted and secure.

Scalability and Flexibility

Scalable Architecture: REST APIs enable a scalable architecture where multiple clients can interact with blockchain nodes concurrently.
Flexible Deployment: REST APIs can be deployed in various environments (on-premises, cloud, hybrid), offering flexibility in how blockchain applications are developed and deployed.

Bridging Applications and Blockchain

Interface for Interaction: REST APIs serve as an interface between client applications and blockchain nodes. They allow applications to interact with the blockchain without needing to understand the underlying blockchain protocols.
Simplified Access: Through REST APIs, developers can perform operations like querying the blockchain, submitting transactions, and retrieving data in a simplified and standardised manner.

Middleware Role

Middleware Function: REST APIs can act as middleware that translates client requests into appropriate blockchain node RPC (Remote Procedure Call) commands. This middleware abstracts the complexity of blockchain interactions.
Error Handling: REST APIs can manage errors and exceptions, providing informative responses to clients, and handling retries or fallbacks as needed.

The connection of the nodes to REST APIs is fundamentally about providing a bridge between the blockchain's complex, low-level operations and the high-level, user-friendly interfaces that applications use. Nodes handle the core blockchain functions, while REST APIs offer a standardised, secure, and accessible way for applications to interact with these nodes.

Role of the Message Bus

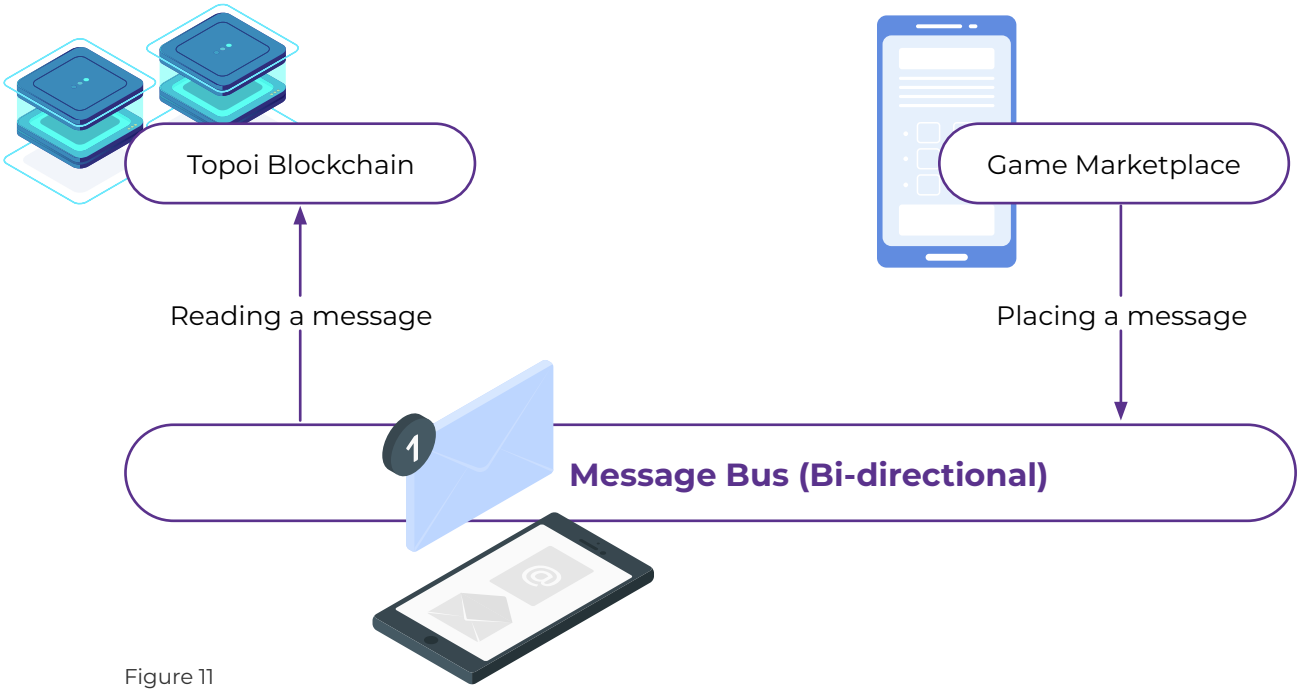


Figure 11

Topoi uses a **Message Bus** in our blockchain architecture. A **Message Bus** is a communication system that facilitates the exchange of messages between different components or services in a distributed architecture. It acts as an intermediary, enabling asynchronous communication and decoupling the sender and receiver of messages.

Its integration brings significant benefits in terms of interoperability, scalability, modularity, resilience, real-time communication, simplified integration, security, and efficient resource utilisation. These advantages help create a more robust, adaptable, and future-proof blockchain network.

Key Functions

Message Routing and Distribution

Publish-Subscribe Pattern: It allows messages to be published to specific channels or topics, and received by any number of subscribers. This enables real-time broadcasting of information to multiple consumers.
Point-to-Point Messaging: It supports direct message delivery from one sender to one receiver, ensuring messages are delivered to a specific target.

Performance and Scalability

Decoupling Components: By acting as an intermediary, the Message Bus decouples communication between different services or components. This allows each component to operate independently, improving modularity and ease of maintenance.
Asynchronous Advantages: The asynchronous model allows for better handling of high-volume and high-latency tasks, as processing can be distributed and completed independently.
Scalability and resilience: A Message Bus is inherently scalable as it can buffer and queue messages, distributing the load across multiple consumers. High-volume transaction data can be published to the Message Bus and processed by multiple consumer services in parallel, ensuring the system can handle large-scale data processing.

Reliability and Fault Tolerance

Built-In Retry Mechanisms: Many Message Bus systems have built-in retry and dead-letter queue mechanisms to handle message delivery failures.
Resiliency: Consumers can process messages at their own pace, and messages can be continued until successfully processed, enhancing fault tolerance.

Topoi: Enhancing Blockchain Systems with Modular Programming and Containers

At Topoi, we believe in utilising the best of modern software development techniques to deliver high-performance, scalable, and secure blockchain solutions. Our commitment to excellence drives us to adopt modular programming using containers and parallel programming, ensuring our systems are robust, efficient, and adaptable to the dynamic needs of the industry.

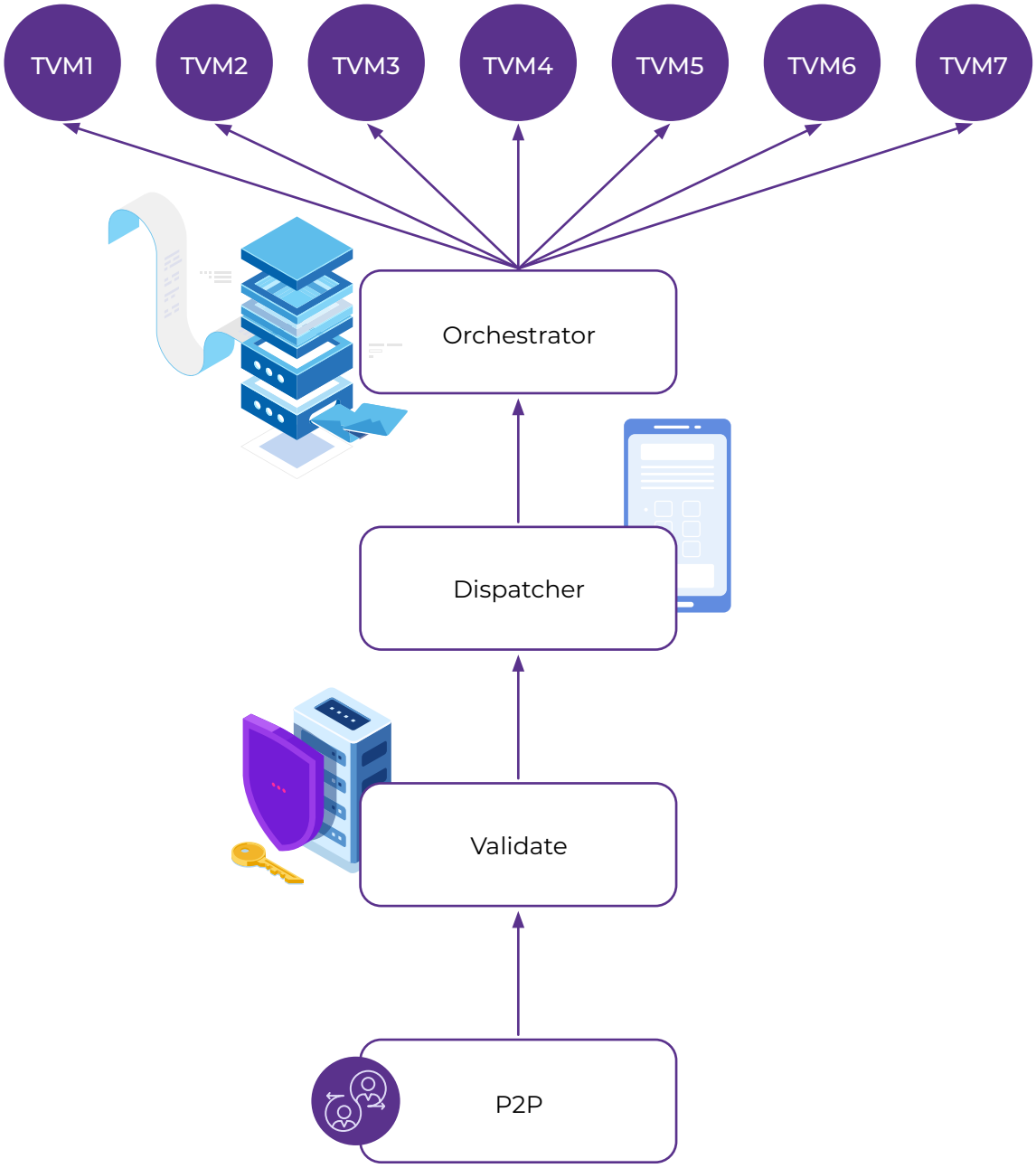


Figure 12

Modular Programming with Containers: Building Blocks of Efficiency

Containers are lightweight, portable, and self-sufficient units that package software and its dependencies, ensuring consistent runtime environments across different computing environments.

By breaking down our blockchain applications into modular components, each encapsulated within its container, we achieve unparalleled isolation and independence. This approach allows each module, whether it is for our TVM and transaction processing, smart contract execution, or consensus management, to operate in its environment, free from interference from other components. This not only enhances security but also simplifies debugging, testing, and maintenance.

In addition, containers provide an environment that can be easily scaled. As our clients' demands grow, we can seamlessly scale individual modules without impacting the entire system. This flexibility ensures that our blockchain network can handle increased transaction volumes and new features without downtime or performance degradation.

Parallel Programming: Unlocking Performance and Speed

Multiplying Topoi Virtual Machines Using Parallel Programming

Topoi Virtual Machines (TVMs) can be effectively multiplied and managed using parallel programming techniques to optimise the performance, scalability, and efficiency of blockchain systems. Here is how parallel programming can be applied to multiply and manage TVMs:

Parallel TVM Provisioning

Simultaneous Creation: Parallel programming can be used to create multiple TVMs simultaneously. Instead of provisioning TVMs one by one, scripts and orchestration tools can launch several TVMs in parallel, significantly reducing setup time.

Parallel Resource Allocation

Dynamic Scaling: Parallel programming can dynamically allocate resources to TVMs based on current demand. For instance, during high traffic periods, additional TVMs can be instantiated in parallel to handle the load.

Load Balancing: Load balancers can distribute incoming requests to TVMs running in parallel, ensuring optimal allocation of resources and avoiding overloading any single TVM.

Parallel TVM Management

Concurrent Operations: Maintenance tasks such as updates, backups, and monitoring can be performed concurrently across multiple TVMs. This ensures that the entire system remains up-to-date and secure without significant downtime.

Parallel Execution of Tasks

Distributed Computing: Tasks can be distributed across multiple TVMs to be executed in parallel. This is particularly useful where large-scale data processing, transaction validation, and smart contract execution are required.

Parallel Network Communication (P2P)

Concurrent Networking: TVMs can handle multiple network connections simultaneously. This parallel network communication enhances the speed and reliability of data exchange within the blockchain network.

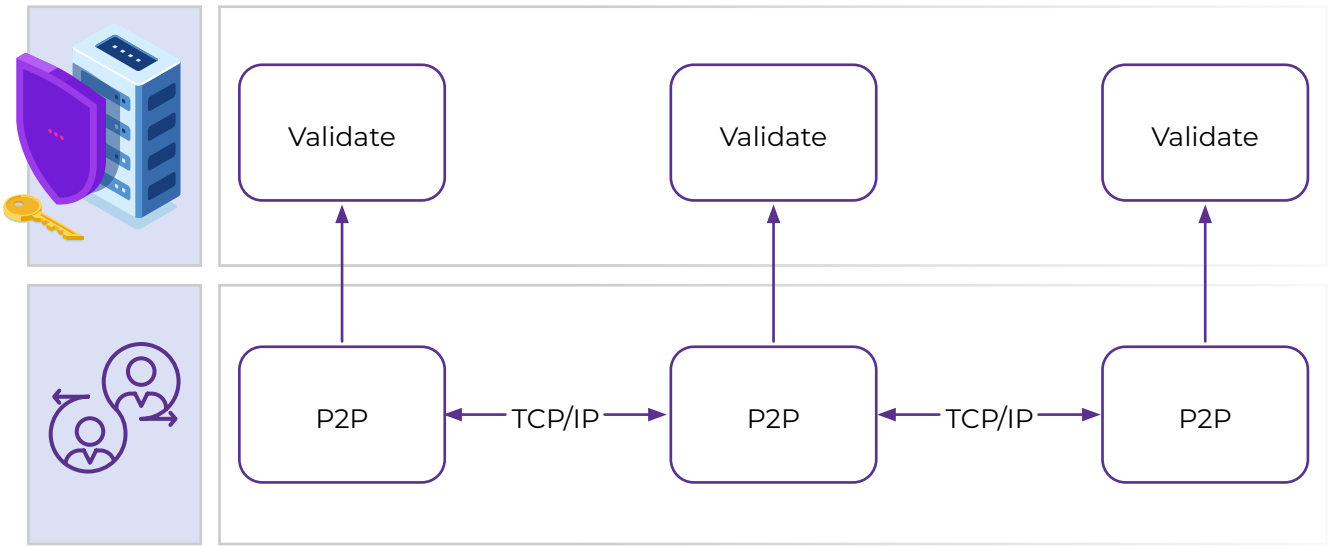


Figure 13

Parallel programming is a powerful tool for enhancing P2P communication in blockchain networks. By enabling concurrent data transmission, parallel message processing, and efficient load distribution, parallel programming can significantly improve the performance, scalability, and reliability of P2P networks.

Topoi's parallel network facilitates faster transaction processing, quicker consensus, and a more resilient blockchain system capable of meeting the demands of modern decentralised applications. It allows:

Improved Consensus Mechanisms

Parallelising components of our consensus algorithms — such as block proposal, voting, and signature verification — enhances the speed and robustness of reaching consensus. This ensures our blockchain network remains secure and resilient against attacks, providing our clients with a trusted and reliable platform.

Real-Time Analytics and Monitoring

Parallel programming allows us to perform real-time analytics on blockchain data, providing instant insights into network performance, transaction patterns, and potential anomalies. This proactive monitoring helps us maintain optimal performance and security, ensuring our clients always operate with the most up-to-date and reliable data.

The Combined Power of Modular Programming and Parallel Programming

Synergy for Superior Solutions

The integration of modular programming with containers and parallel programming creates a synergy that elevates Topoi's blockchain solutions to new heights. Each modular component benefits from parallel processing capabilities, enhancing the overall system's efficiency, reliability, and scalability.

Future-Proofing Our Blockchain

Our adoption of these advanced programming techniques ensures that our blockchain infrastructure is future-proof. As technology evolves and demands increase, our modular and parallel approach allows us to adapt quickly, integrating new advancements without overhauling the entire system.

Delivering Excellence to Our Clients

At Topoi, our priority is delivering excellence to our clients. By making use of modular programming and parallel programming, we provide blockchain solutions that are not only high-performing and scalable, but also secure and reliable. Our clients can trust in a system that is designed to meet their current needs and grow with their future aspirations.

Oracles

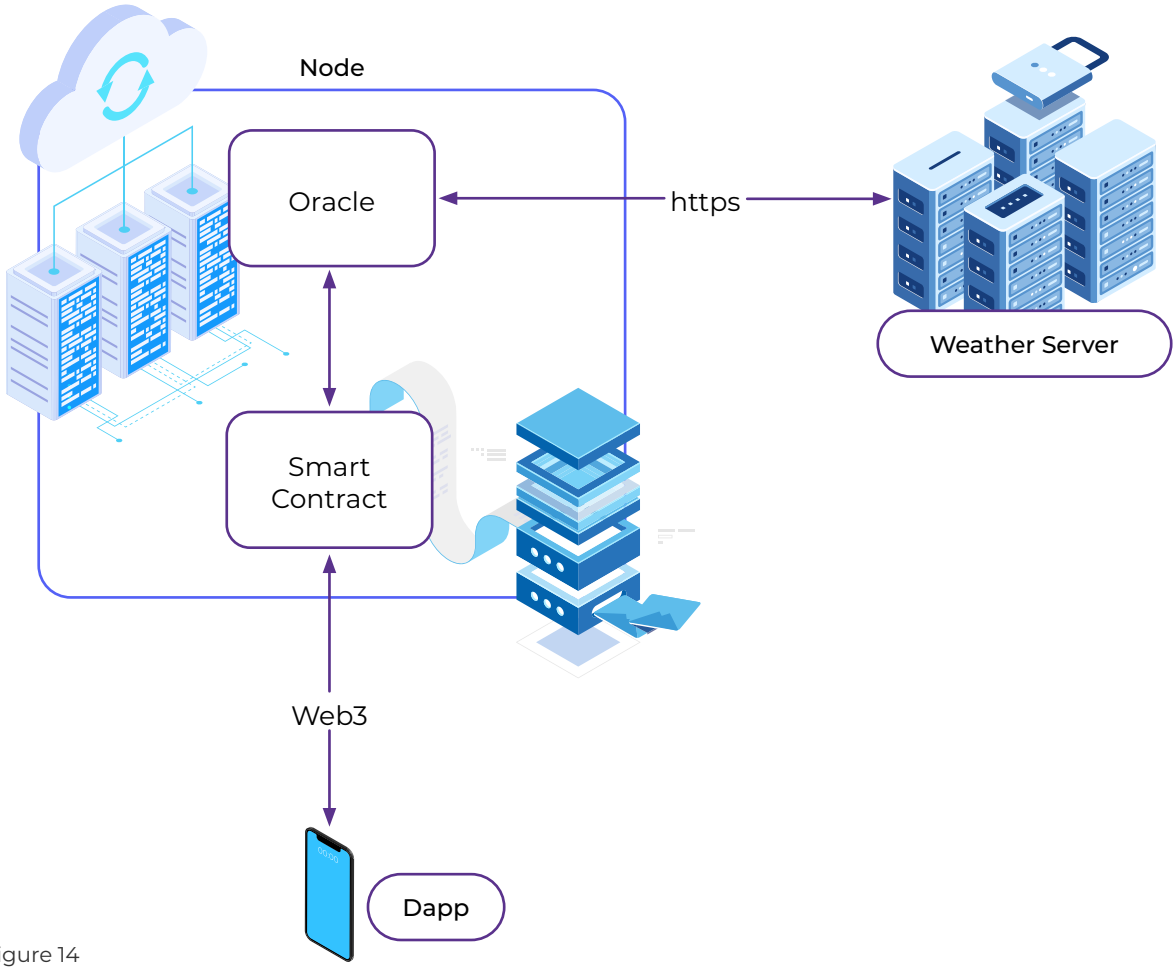


Figure 14

An oracle refers to a service or mechanism that provides external data to smart contracts. The DApps can then call the smart contract to retrieve the data from the blockchain. Oracles act as intermediaries between the smart contract and real-world data sources, such as REST APIs, web servers, or external databases. Their primary function is to fetch and verify off-chain information.

Oracles are deployed on the Topoi blockchain network as specialised services or software components that facilitate the interaction between smart contracts and external data sources. There are several approaches to deploying oracles on a blockchain:

Decentralised Oracles

Decentralised oracles operate in a trust-minimised manner, employing multiple independent data sources and consensus mechanisms to provide reliable data to the blockchain. Decentralised oracles use crypto signatures to ensure the accuracy and integrity of the data they provide.

Data Feeds

Oracles fetch real-world data from external sources, such as REST APIs and web servers. This data is then transmitted directly to the smart contracts.

Transaction Execution

Smart contracts can trigger oracle requests to fetch specific data or perform actions based on external conditions. Oracles execute these requests off-chain, gather the required data, and relay it back to the smart contract.

Data Verification

Before transmitting data to the smart contract, oracles perform verification checks to ensure the integrity

Transaction Settlement

Once the data is received and verified, the smart contracts finalise the transaction by submitting the data to the blockchain.

7 Tokenomics and Economics

Topoi Token

The Topoi token is the native token for the Topoi protocol and Topoi Blockchain.

Its core functions are:

Transaction fee payments on the Topoi blockchain	Protocol governance	Incentivisation	Protocol insurance

Topoi issuance mechanism

The protocol has a fixed supply of 30 billion Topoi tokens with an integrated deflationary mechanism similar to the one used for Bitcoin: the process of 'halving' built into the Topoi protocol reduces the reward validators receive for adding new blocks to the blockchain by half approximately every four years, for a duration of 200 years from the genesis block.

Every second a new block is created and every 126,144,000 blocks, the reward for validating a new block is cut in half. Halving controls the supply of new Topoi tokens being introduced to the market. This helps to keep inflation in check and ensures that the total supply of Topoi will never exceed 30 billion.

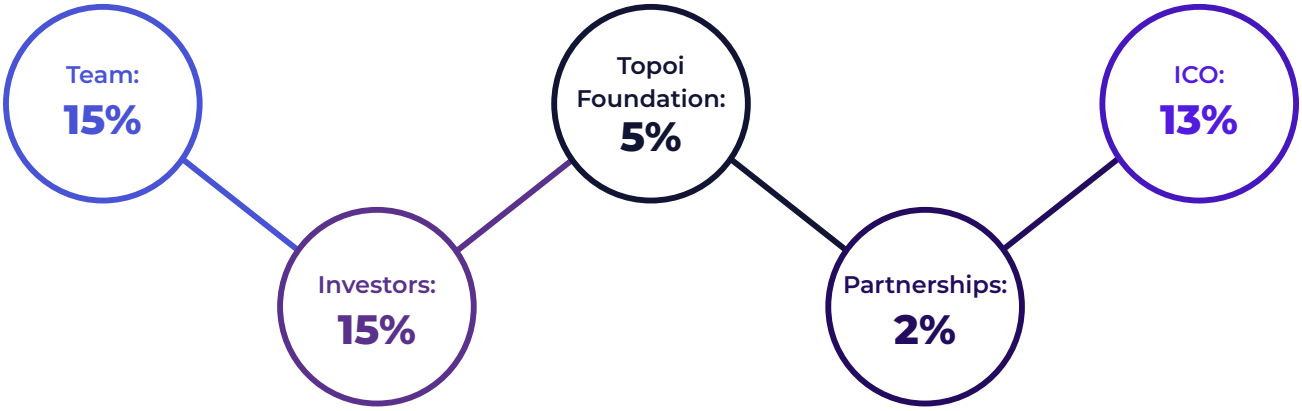
Topoi Staking

In-wallet staking of Topoi provides an annual percentage yield (APY). It has a utility function for DeFi users and long-term appreciation.

Validators are required to stake a certain amount of Topoi tokens as collateral in order to participate. 100% of the block rewards will be given to the validators.

The initial distribution

To ensure decentralisation, no single entity should hold a majority stake of tokens. Each stake should not exceed 25%. A total of 6,000,000,000 Topoi tokens will be minted at inception.



Topoi Revenue streams

Topoi's protocol generates revenue through various types of economic activities within its ecosystem. These revenues are funnelled into the Topoi treasury, which is responsible for funding the protocol's ongoing operations. This includes covering development costs, operational expenses, insurance, block rewards, and maintaining infrastructure. The aim is to ensure the smooth operation and sustainability of the decentralised protocol and its blockchain. The allocation of these funds is flexible and can be adjusted based on risk assessments and commercial agreements. This dynamic approach allows our protocol to adapt to changing conditions and needs effectively.

- 1. Fiat on/off ramp transactions fees
- 2. Blockchain transaction fees
- 3. Blockchain Bridge transaction fees
- 4. NFT creation fees
- 5. NFT transaction fees
- 6. Lending and borrowing fees
- 7. Merchant fees (APIs)
- 8. Trading overlays
- 9. Bid to Ask spread
- 10. FX conversion fees
- 11. AI trading bots generating buy/sell signals
- 12. Card Payment fees
- 13. Hardware wallets

Topoi Transaction rates

Comprehensive comparison of rates in the current market

Credit Card transaction fees	Interchange fees	Acquirer fees	Payment Gateway	Total
Mastercard	0.2%	0.01%	1%	1.3%
Visa	0.2%	0.01%	1%	1.3%
Revolut	3%			
Monzo	3%			

Fiat to crypto transaction fees	On-Ramp	Off-Ramp
MELD	0.05%	0.05%
COINBASE	3%	3%
BINANCE	€5	€25
RAMP	0.9%	0.9%
CRYPTO.COM	Regular Bank Transfer Fees	€45

Topoi Transaction Fees

Topoi operates using a fixed rate system:

1	Fiat Bank transfer/ On-Ramp/ Off-Ramp fees using Open Banking API: 0.05%
2	Blockchain Network fees: 0.5%

Blockchain Bridge fees below:

Topoi Cross-Chain transactions	Blockchain Bridge Fees
BITCOIN	0.5% + Bitcoin Network Fees
ETHEREUM	0.5% + Ethereum Network Fees
ARBITRUM	0.5% + Arbitrum Network Fees
OPTIMISM	0.5% + Optimism Network Fees

Topoi DeFi: Lending and borrowing

Topoi offers a decentralised finance (DeFi) protocol that allows users to lend and borrow both fiat and cryptocurrencies without relying on a centralised intermediary.

Each underlying asset has a dedicated liquidity pool with specific durations, including 1 month, 3 months, 6 months, 1 year, 2 years, 5 years, 10 years, 20 years, and 30 years. Additionally, we offer a flexible liquidity pool that allows users to lend or borrow without locking up their underlying assets for a predefined duration. Each liquidity pool operates through its own independent smart contract.

- **Short-term duration is: 1, 3, and 6 months**
- **Medium-term duration is: 1, 2 and 5 years**
- **Long-term duration is: 10, 20 and 30 years**

Future interest rates can be represented by a **yield curve**, which can then be used to calculate the present value (PV) of financial instruments.

DeFi Lending and Borrowing revenue
- **0.9% of borrowing rate**
- **0.10% of yield generated**

Lending on Topoi

Depositing Assets

- Users deposit cryptocurrencies or fiat currencies into Topoi liquidity pools. These deposits are used to provide liquidity for the protocol.
- In return for their deposits, lenders receive StTokens (e.g., StETH for Ethereum), which represent their share in the pool and accrue interest over time.

Earning Interest

- Yields on Topoi are determined algorithmically based on supply and demand. When demand for borrowing an asset increases, the interest rate for that asset goes up, incentivising more users to lend their assets.
- Lenders earn interest continuously, which is reflected in the increasing balance of their StTokens.

Borrowing on Topoi

Collateralisation

- To borrow assets, users must first deposit collateral into the Topoi protocol. The amount they can borrow depends on the value of the collateral and the Loan-to-Value (LTV) ratio, which varies for different assets.
- For example, if the LTV ratio is 75%, a user can borrow up to 75% of the value of their collateral.

Borrowing Assets

- Users can choose between fixed interest rates, which provide predictable borrowing costs, and variable interest rates, which can change based on market conditions.
- Once the collateral is deposited, users can borrow assets from the liquidity pool. The borrowed amount is credited to the user's account, and the user can use these assets as they wish.

Repaying the Loan

- Borrowers can repay their loans within the timeframe they have chosen i.e. short-, medium- or long-term duration. When they repay, they must return the borrowed amount plus any accrued interest.
- After repayment, the collateral is unlocked and can be withdrawn by the borrower.

Liquidation

- If the value of the collateral falls below a certain threshold (due to market fluctuations), the loan may become under-collateralised. To protect the protocol, the collateral may be liquidated to repay the loan.
- Topoi employs a liquidation mechanism where liquidators are incentivised to repay part of the borrower's debt in exchange for a portion of the collateral at a discount.

Features of Topoi

- **Rate Switching:** Topoi allows borrowers to switch between fixed and variable interest rates, offering flexibility to manage their borrowing costs.

Topoi's innovative approach to decentralised lending and borrowing offers users flexibility, security, and control over their financial activities. By utilising smart contracts and liquidity pools, Topoi creates a frictionless and efficient financial ecosystem where users can lend, borrow, and earn interest on their assets. DeFi represent a very important source of revenue for Topoi.

8 Community and Governance

Principles for Topoi Blockchain Governance

Trust Minimisation

Trust minimisation is the principle that a blockchain system should operate without requiring participants to trust any single entity or intermediary. In governance, this means decisions are made through decentralised mechanisms, reducing the need to trust central authorities. Topoi ensures that the system remains fair and resistant to corruption, as no single party has undue influence over the network.

Censorship Resistance

Censorship resistance ensures that no participant can prevent others from interacting with the Topoi blockchain or participating in governance. It is crucial in maintaining an open and inclusive environment. This principle protects against the exclusion of participants or the blocking of transactions, ensuring that governance remains open to all stakeholders.

Permissionlessness

Permissionlessness means that anyone can participate in the Topoi blockchain network without needing approval from a central authority. In governance, this principle allows any stakeholder to propose changes, vote, or participate in consensus. It ensures a truly decentralised and democratic governance process, in which power is not centralised and concentrated in the hands of a few.

Auditability

Auditability allows all actions and decisions on the Topoi blockchain to be traced and verified. In governance, this principle ensures that all processes are transparent and can be reviewed by participants. This transparency is crucial for building trust in the system, as participants can verify that rules are being followed and that no malfeasance is occurring.

Reconcilability

Reconcilability is the ability to resolve differences between records on the blockchain and external systems. In governance, this principle ensures that any discrepancies between the blockchain and other systems can be identified and addressed. This is important for ensuring that the Topoi blockchain's records are accurate and consistent with external realities, such as legal or regulatory requirements.

Least Authority

The principle of least authority suggests that Topoi participants should only have the minimum level of access or control necessary to perform their roles. In governance, this minimises the risk of abuse of power or centralisation of control. By limiting the power of any single participant, this principle helps maintain a more decentralised and secure governance structure.

Adherence

Adherence refers to the consistent following of established rules and protocols in Topoi's governance. This principle ensures that all participants act in accordance with agreed-upon guidelines and procedures. Adherence is crucial for maintaining order and predictability within the governance process, ensuring that decisions are made fairly and consistently.

Topoi T* Consensus Mechanism (PoS)

Topoi uses a PoS based T* consensus protocol. The consensus mechanism is fundamental as it stands as the backbone that ensures all participants within a blockchain network reach agreement on a single, unified version of the ledger's history.

This mechanism coordinates the validation and recording of transactions, ensuring that each entry is legitimate and consistently acknowledged across the entire network. By resolving discrepancies and achieving agreement among distributed nodes, the consensus mechanism upholds the integrity, security, and trustworthiness of the blockchain, maintaining a coherent and reliable transaction history.

Topoi Hybrid Governance

On-Chain Governance

Description: Governance processes that occur directly on the Topoi blockchain, where participants use the network to propose and vote on changes.

Examples: Topoi token holder voting, staking-based voting, on-chain referendums.

Role in Governance: Allows decentralised decision-making by enabling stakeholders to directly influence protocol upgrades, parameter changes, and other key decisions.

Off-Chain Governance

Description: Governance processes that occur outside of the Topoi blockchain, often involving discussions, informal agreements, or decisions made by core developers, stakeholders, or governance councils.

Examples: Developer meetings, community forums, improvement proposal processes.

Role in Governance: Facilitates broader discussions and consensus-building before implementing changes on-chain.

Voting Systems

Description: The methods by which participants in the Topoi network express their preferences or make decisions.

Examples: Direct voting, quadratic voting, weighted voting based on token holdings, liquid democracy.

Role in Governance: Determines how decisions are made, who gets to vote, and how votes are counted and implemented.

Incentive Structures

Description: The rewards and penalties that motivate participants to act in the best interests of the Topoi network.

Examples: Block rewards, staking rewards, slashing penalties for validators, governance participation rewards, airdrops.

Role in Governance: Aligns participants' incentives with the health and success of the network, encouraging civic behaviour and participation.

Dispute Resolution Mechanism

Description: Processes for resolving conflicts or disputes within the network, especially regarding governance decisions or protocol behaviour.

Examples: Arbitration processes, formalised governance councils, community voting on contentious issues.

Role in Governance: Maintains network stability and fairness by providing a way to handle disagreements.

Community and Developer involvement

Description: The active participation of developers, users, and other stakeholders in the ongoing development and governance of the blockchain.

Examples: Open-source development contributions, community discussions.

Role in Governance: Ensures that the blockchain evolves in a way that reflects the needs and desires of its users and contributors.

Topoi Documentation

Description: The practice of making all Topoi governance-related information, decisions, and processes publicly available and easily accessible.

Examples: Publicly accessible voting records, transparent decision-making processes (accessible on the Topoi website) and open-source codebases (Github).

Role in Governance: Builds trust in the governance process by allowing participants to see how decisions are made and implemented on Topoi.

9 Security and Privacy

At Topoi, we prioritise security above all because it is the cornerstone of trust in the crypto ecosystem. We take this responsibility with the utmost seriousness. Implementing robust security measures ensures that our platform remains resilient against cyber-attacks, protecting our users and preserving the integrity of their transactions.

In a landscape where the irreversible nature of blockchain technology leaves no room for error, our commitment to security not only safeguards our users, but also upholds our reputation as a reliable and trustworthy service provider. By continuously enhancing our security protocols, we aim to provide a safe and secure environment in which users can confidently manage and grow their digital assets.

Layered Security Protocol

Topoi employs a layered approach to security, ensuring comprehensive protection for our platform and our users. This involves multiple key levels, each addressing different aspects of security to provide comprehensive protection. Here are the key levels typically involved in such an approach:

Infrastructure Security
Network Security: Implementing firewalls, gateways, intrusion detection systems (IDS), and intrusion prevention systems (IPS) to protect against network-based threats.
Server Security: Ensuring secure server configurations, regular patching, and updates to address vulnerabilities.

Application Security
Code Review and Testing: Regular code reviews, static and dynamic analysis, and penetration testing to identify and fix vulnerabilities in the application code.
Secure Development Practices: Following secure coding guidelines and best practices during the development process.
API Security: Ensuring secure APIs to prevent unauthorised access and data breaches.
Implementation of Single Sign-On (SSO): This ensures seamless authentication and authorisation.

Data Security
Encryption: Encrypting data at rest and in transit to protect it from unauthorised access and tampering. A user's private key is always kept confidential. With elliptic curve cryptography, it is impossible to reverse-engineer a public key to derive the private key.
Data Integrity: Implementing checks to ensure data integrity and prevent unauthorised modifications.
Backup and Recovery: Regularly backing up data and having a robust disaster recovery plan in place.

Communication Security
All communications are safeguarded using SSL via HTTPS.

Access Control
Authentication: Implementing strong authentication mechanisms, such as multi-factor authentication (MFA), to verify user identities.
Authorisation: Ensuring that users have appropriate permissions and access controls based on their roles.

User Security
Education and Awareness: Educating users about security best practices, such as recognising phishing attempts and using strong passwords.
User Privacy: Ensuring user privacy by protecting personal data and complying with relevant data protection regulations.

Monitoring and Incident Response
Real-Time Monitoring: Continuous monitoring of systems and networks to detect and respond to security incidents promptly.
Incident Response Plan: Having a well-defined incident response plan to address and mitigate security breaches effectively.
Logging and Auditing: Maintaining logs of all activities and conducting regular audits to identify and address potential security issues.

Compliance and Governance

Regulatory Compliance: Ensuring compliance with relevant laws and regulations.
Security Policies: Establishing and enforcing comprehensive security policies and procedures across the organisation.

Topoi guarantees a robust and resilient defence against a wide range of threats. Our commitment to a layered security strategy allows us to provide a secure and trustworthy environment for transferring, managing and growing our customers' digital assets, ensuring peace of mind for all our users.

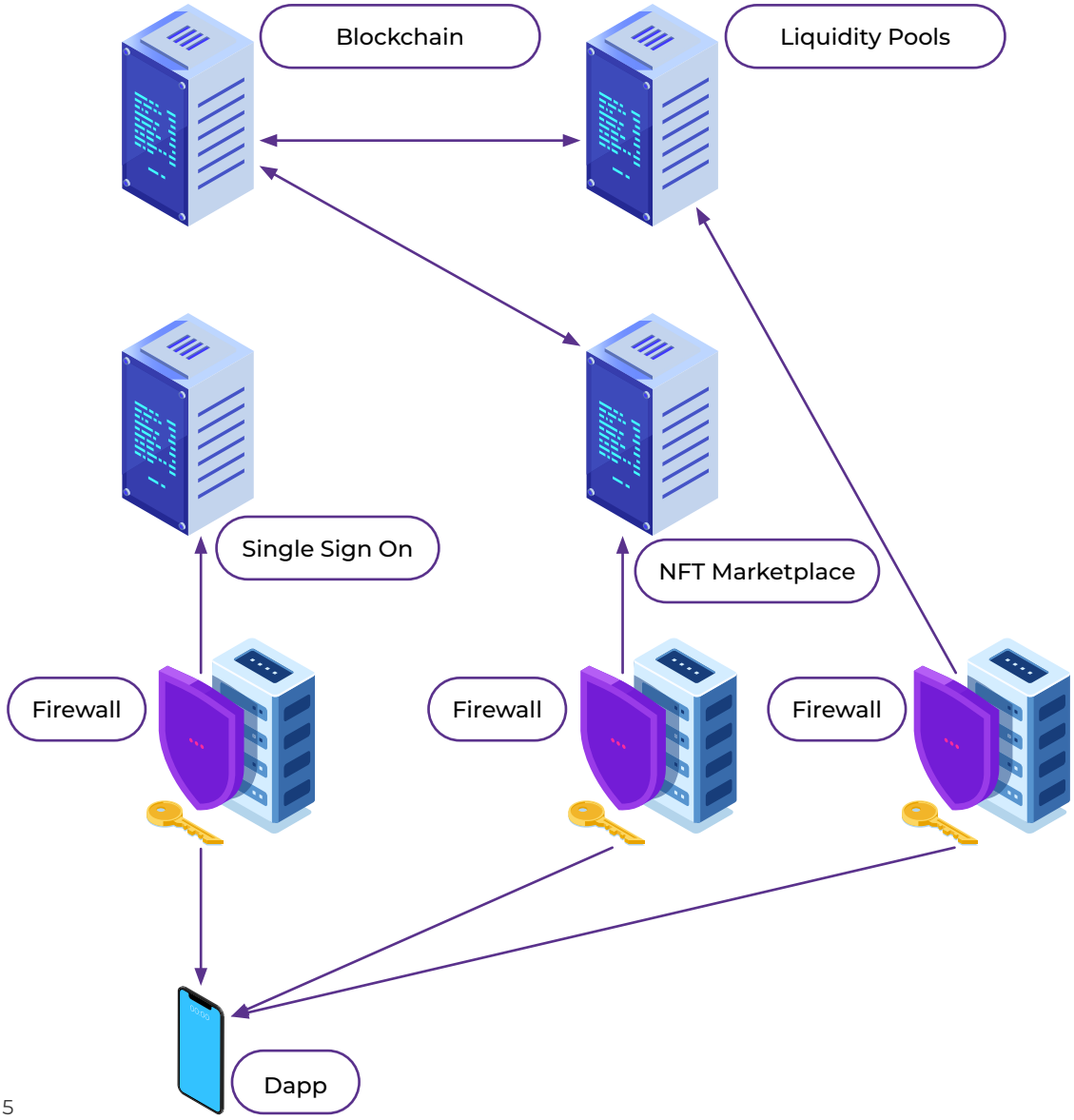


Figure 15

Auditing and Pen Testing

At Topoi, we place a paramount emphasis on auditing and penetration testing as integral components of our security framework. These rigorous evaluations are essential for identifying and addressing potential vulnerabilities, ensuring that our systems, applications, and smart contracts remain resilient against evolving threats. By conducting regular audits and penetration tests, we proactively fortify our defences and uphold the highest standards of security.

To further bolster our security measures, we partner with reputable third-party blockchain auditing firms to rigorously perform these critical assessments. Additionally, we receive cybersecurity certifications to validate our adherence to industry best practices. Upon the expiration of these certifications, we commit to another round of comprehensive penetration testing every 3 to 5 years. This ongoing process not only reinforces our dedication to protecting our users' assets, but also maintains their trust and confidence in our platform.

10 Roadmap and Development

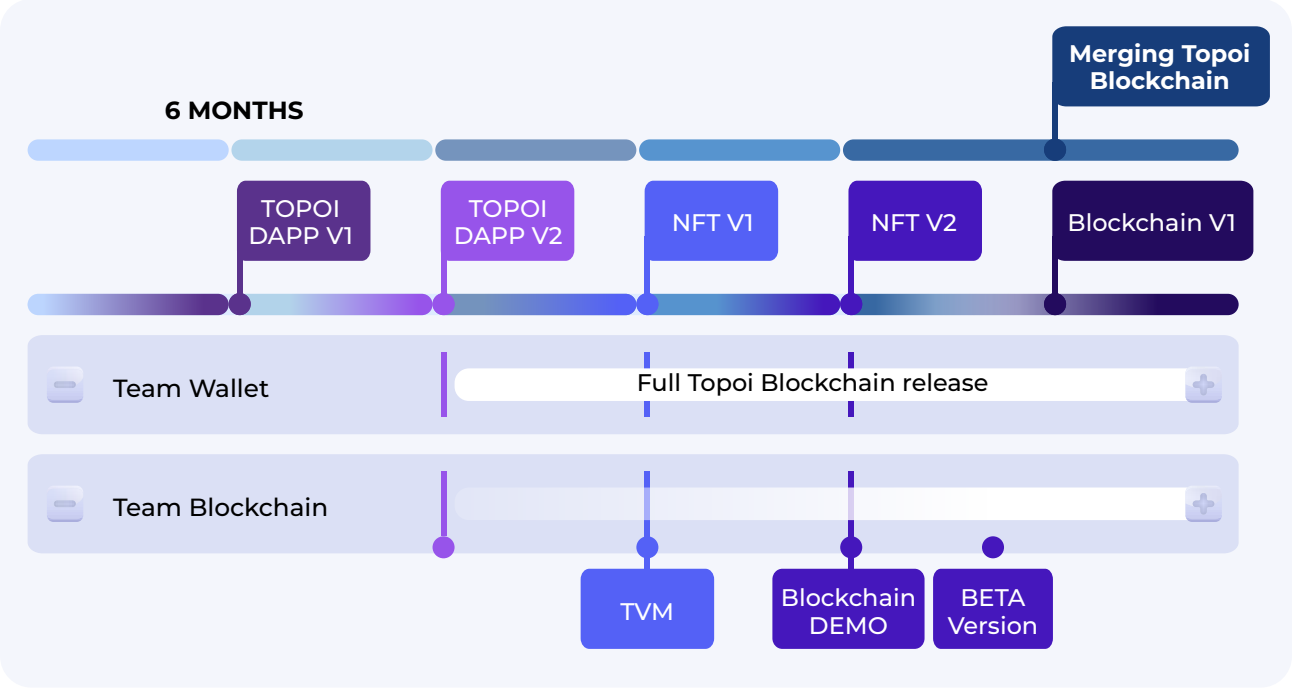


Figure 16

MVP Version 1

6 Months full release

What we offer:

1	2	3	4
Topoi DApp only available for personal users. No Business users	Fiat to crypto On/Off ramp transfers	Bank to bank transfers	Crypto wallets

MVP Team

4	Founders	1	Product owner	1	Marketing manager
1	Mobile developer	1	Infrastructure engineer	1	Social media/ Community manager
2	Back-end developers	1	QA Engineer	1	Accountant

11 Regulatory Compliance

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12 Conclusion

In conclusion, the Topoi blockchain ecosystem, built on a modular parallel architecture, is designed to be future-proof, ultra scalable and resilient, ready to meet the demands of tomorrow's digital economy.

As blockchain technology continues to evolve and becomes more efficient and interoperable, it holds the potential to revolutionise how money moves, enabling faster, more secure, and more transparent transactions across the globe. Individuals will be able to effectively preserve and grow their wealth with Topoi in the crypto space through the standardisation and use of blockchain and Web3 technology.

In the future, traditional finance and many aspects of the world's current systems will transition onto blockchains, fundamentally transforming how we operate and interact with the world.

Topoi's innovative approach paves the way for mass adoption by creating a blockchain that serves everyone — from individual users and large corporations to financial institutions and the unbanked. By breaking down barriers and fostering inclusivity, we aim to be at the forefront of a new financial era, where technology empowers and connects all.

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