Metal Blockchain

Whitepaper

METALBLOCKCHAIN.ORG

VERSION 1.1

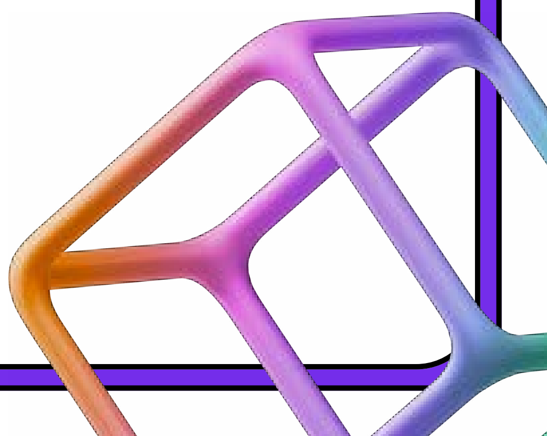
Abstract

In this whitepaper, we present the Metal blockchain, a high performance layer zero blockchain and open-source platform designed for launching decentralized applications (DApps) and enterprise blockchain deployments. We will provide an in-depth introduction to Metal Blockchain, highlighting its key features, vision, and mission.

We will delve into the innovative and scalable subnet architecture that allows for efficient transaction processing. We will also discuss the highly energy-efficient and sustainable consensus mechanisms employed by Metal Blockchain. Furthermore, we will cover the METAL tokenomics, including details on its supply, distribution, and usage within the ecosystem.

Additionally, we will explore the staking and delegation mechanisms, which play a vital role in securing and maintaining the Metal Blockchain network. We will outline the requirements for becoming a validator or a delegator, the staking durations, rewards distribution, and other relevant details.

Table of contents



1. Introduction

Metal Blockchain is a highly performant layer zero blockchain and open-source platform that builds upon the innovative Snow protocols introduced by Avalanche and enables the launch of decentralized applications (DApps) and enterprise blockchain deployments in a highly scalable ecosystem.

Designed for global finance, Metal Blockchain provides near-instant transaction finality, making it ideal for high-performance applications.

The Metal Blockchain's design enables an infinite number of subnets to be deployed, each capable of processing 4,500 transactions per second, theoretically allowing for an unlimited total transactions per second across all subnets.

This unique approach to scalability ensures that the Metal Blockchain can handle a massive volume of transactions, making it a highly efficient and scalable solution for decentralized applications and enterprise blockchain deployments.

In addition, developers familiar with Ethereum and Antelope (formerly EOSIO) will find it easy to build on Metal Blockchain, as it supports popular programming languages such as Solidity on the Contract Chain (EVM), C++, and Typescript on the Proton Chain (AVM), out-of-the-box, for smart contract deployments. This allows developers to leverage their existing knowledge and expertise to create DApps on Metal Blockchain seamlessly.

With its robust smart contracts platform, Metal Blockchain offers a decentralized and secure environment for building a wide range of DApps, from financial applications to supply chain management solutions and beyond. Its scalable ecosystem enables efficient transaction processing, making it suitable for both small-scale and large-scale deployments.

Metal Blockchain is not only a powerful platform for DApps, but it also prioritizes security, reliability, and sustainability. Its innovative consensus mechanism ensures the integrity of transactions and data, while its energy-efficient design makes it a greener alternative to traditional blockchain platforms.

One of Metal's key advancements is the addition of a fourth subchain called Proton (A Chain) which offers a more optimized layer for payments and decentralized finance.

Proton is based on the cutting-edge EOSIO protocol and incorporates WebAssembly (WASM) to enhance its performance. This makes Metal Blockchain a more scalable and resource-efficient platform for facilitating transactions and powering DeFi applications.

Metal Blockchain aims to provide a seamless and user-friendly experience for Web3 adoption by eliminating the need for external wallet software outside of the browser. Metal Blockchain plans to achieve this by incorporating Web Authentication (WebAuthn) support for Ethereum Virtual Machine (EVM), making it more convenient and secure for users to interact with the blockchain using their browsers.

Our on-chain key recovery protocol (to be developed) will ensure that customers never have to worry about losing their private key. Institutions can set secure permissions that allow administrators to reset users keys without accessing confidential data, allowing recovery through biometric authentication.

This approach promises to deliver a more native and intuitive Web3 experience for users of the Metal Blockchain.

Metal Blockchain will uphold the same level of compliance on the blockchain as current institutional infrastructures. Incorporating the latest W3C standards on digital identity and Swift ISO 20022, Metal's upcoming blockchain-based digital identity system will offer flexibility in maintaining records of every identity across all network nodes.

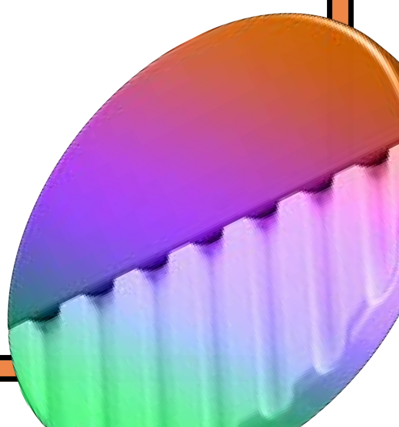
2. Vision and Mission

The vision of Metal Blockchain is to revolutionize the global finance industry by creating a decentralized smart contracts platform that enables businesses to operate with greater efficiency, transparency, and security.

The mission of Metal Blockchain is to provide developers with a robust and versatile platform for building the next generation of DApps and enterprise blockchain solutions. The platform provides near-instant transaction finality, high throughput, and strong safety guarantees while maintaining decentralization.

Metal Blockchain achieves this through its novel consensus mechanism, which is highly energy-efficient and sustainable, making it a greener alternative to traditional blockchain platforms.

The Metal Blockchain ecosystem is designed to be highly scalable and interoperable, providing developers with unparalleled flexibility and customization for their applications. The platform's support for multiple programming languages and its seamless integration with existing blockchain platforms such as Ethereum and Antelope (formerly EOSIO) makes it easy for developers to get started with building on the platform.



3. Metal Blockchain Overview

In the following section, we will delve into the specifics of the Metal Blockchain. We will cover the flow and components of a single blockchain, explore the scalability of the chain through the subnet architecture, and take a deeper look at the Avalanche Consensus Protocols and the decentralized independent governance model that Metal Blockchain utilizes.

3.1 Decentralized Network

The Metal Blockchain is fully decentralized. The potential for adversarial attacks such as double spends, chain splits, and 51% attacks are mitigated through the use of the Avalanche Consensus Protocols, which relies on Validators and Delegators (stakers) to uphold the network constitution. The Metal blockchain is permissionless and supportive of the FOSS movement. Our open-source documentation can be found on GitHub here.

3.2 Layer Zero Blockchain

Metal Blockchain is a high performant layer zero blockchain, but what does that mean exactly?

A layer zero blockchain is the underlying infrastructure of a blockchain network, comprising protocols, connections, hardware, validators, and other components that make up the backbone of the blockchain ecosystem. This layer provides the necessary services and infrastructure to support the operation of the blockchain, and it plays a crucial role in enabling the platform to achieve its high scalability, security, and decentralization.

Layer 1 blockchains, like Bitcoin, Ethereum, Proton, and others, enable decentralized applications (DApps) and tokens such as Uniswap, Aave, and Axis Infinity to be built on top of them.

Layer 0 blockchains, on the other hand, allow Dapps, tokens and in addition allow entire blockchains to be built on top of them, enabling better cross-chain interoperability thanks to their common underlying layer.

Think of it this way: DApps are like the buildings that everyone visits, Layer 1 blockchains are the plots of land on which they are built, and Layer 0 blockchains are the road networks that connect each land parcel to the next. In other words, Layer 0 blockchains provide the infrastructure and services that are needed to support the operation of a blockchain ecosystem.

3.2.1 What problems do layer zero blockchains solve?

When Layer 1 blockchains were created, they did not anticipate the high demand for block space that has emerged with the boom in DeFi, NFTs and other DApps. As more and more people start using these DApps, the resources of a blockchain can become stretched, leading to high transaction fees and other scalability issues. Layer 0 protocols can help to solve these problems by providing the necessary infrastructure and services to support the operation of a blockchain ecosystem.

In addition to solving scalability issues, Layer 0 protocols also improve the usability of a blockchain platform. Developers on Layer 1 protocols often have to compromise on the design and efficiency of their dApps because the Layer 1 protocol is typically optimized for general use cases rather than the developer's specific use case.

This can be frustrating for developers, and it can limit the potential of a blockchain platform. Layer 0 protocols, on the other hand, enable developers to build blockchains to their precise specifications, giving them more control over the design and functionality of their dApps.

Finally, Layer 0 protocols also give developers more control over the operation of their dApps. On a Layer 1 protocol, the DApps built on top of it are subject to the rules and governance of the Layer 1 protocol. This means that if a bug exists in the Layer 1 protocol, the DApps built on top of it are also affected.

This creates a risk factor for developers, who have no control over the underlying protocol. With Layer 0 protocols, however, developers have more control over the operation of their DApps, and they can respond more quickly to any issues that may arise.

3.2.2 The Layer 0 of the Metal Blockchain

Specifically to Metal Blockchain, the underlying layer includes a number of key components, such as the peer-to-peer network, the Virtual Machine (VM), the consensus protocol, and the subnet architecture.

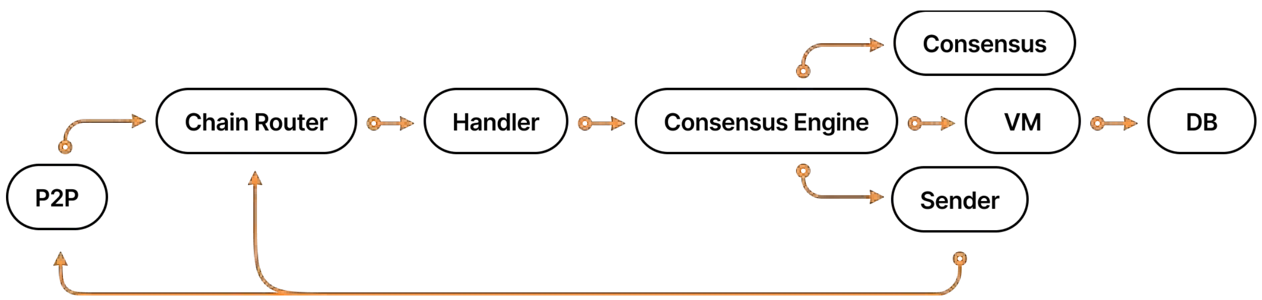
The peer-to-peer network is the communication layer that connects the nodes on the Metal Blockchain platform, allowing them to exchange messages and data.

The Virtual Machine (VM) is the execution engine that runs smart contracts and other code on the network. The consensus protocol is the mechanism that ensures the security and integrity of the network. And the subnet architecture is the structure that divides the network into multiple subnets that can operate independently and in parallel.

Together, these components form the backbone of the Metal Blockchain platform, and they provide the necessary infrastructure and services to support the platform's features and functionality. The layer zero is essential to the operation of the Metal Blockchain platform, and it plays a crucial role in enabling the platform to achieve its high scalability, security, and decentralization.

3.3 Flow of A Single Blockchain and its components

The components of a blockchain on Metal, including the virtual machine, database, consensus engine, sender, and handler, work together to ensure smooth operation. In addition, the P2P layer and chain router facilitate communication between blockchains by allowing them to send and receive messages.



3.3.1 Peer-to-Peer (P2P) layer

The peer-to-peer network is the communication layer that connects the nodes on the Metal Blockchain platform, allowing them to exchange messages and data.

These messaging functions can be grouped into the following categories:

Handshake: Nodes need to have a compatible version before they can join the network.

State Sync: A new node can request the current state of the network from other nodes, only syncing the necessary information for a specific block.

Bootstrapping: Nodes can request blocks from other nodes to construct their own copy of the chain, fetching all blocks from their locally last accepted block to the current last accepted block on the network.

Consensus: Once a node is up-to-date, it can participate in consensus by conducting polls with small, random samples of the validator set, and communicating decisions on whether to accept or reject a block.

App: VMs use application-specific messages to communicate with other nodes through app messages, a common example is mempool gossiping.

3.3.2 Chain Router

The ChainRouter directs incoming messages to the appropriate blockchain by utilizing the ChainID. It does this by delivering messages to the appropriate Chain Handler's queue. The ChainRouter keeps track of all existing chains on the network.

The ChainRouter also manages timeouts. When sending messages on the P2P layer, timeouts are registered on the sender side and cleared on the ChainRouter side when a response is received. If a response is not received, the timeout is triggered. The ChainRouter's handling of timeouts ensures that the handler is reliable. Timeouts are activated when peers do not respond and the ChainRouter will notify the Handler of failure cases. The timeout manager within the ChainRouter is adaptive, adjusting timeouts as necessary when network latencies are high.

3.3.3 Sender

The Sender is responsible for constructing and transmitting outbound messages. It functions as a streamlined version of standard networking code, with added functionality for registering timeouts and informing the router of expected response messages. If a response is not received within the set timeout, the Sender will notify the router of a failure and mark the message as failed. If a node consistently fails to respond, it may be "benched" and lose its rewards as a validator if deemed unresponsive by a significant portion of the network.

3.3.4 Handler

The Handler's primary task is to transfer messages received from the Chain Router to the consensus engine. It accomplishes this by adding the messages to a sync or async queue, depending on their type. The messages are then extracted from the queue, interpreted, and directed to the appropriate function within the consensus engine.

3.3.5 The Virtual Machine

A Virtual Machine (VM) is a blueprint for a blockchain. Just as objects are instantiated from a class definition, blockchains are instantiated from a VM. This allows VMs to define the transactions that are executed on the blockchain and how blocks are created.

VMs can be customized to define a wide range of parameters and features for a blockchain. This flexibility enables the creation of blockchains with different features and capabilities, making it possible to support a wide range of applications and use cases on the Metal Blockchain.

Overall, VMs are an important part of the Metal Blockchain platform, as they provide the foundation for creating and deploying custom blockchains on the network.

3.3.6 Blocks and state

Virtual Machines are used to manage blocks and state in a blockchain. They provide the necessary functionality to define the representation of a blockchain's state, represent the operations that can be performed on that state, and apply those operations to transition from one state to another.

Each block in the blockchain contains a set of state transitions, and these blocks are applied in order from the initial genesis block to the most recent block to arrive at the current state of the blockchain.

A blockchain system typically consists of two major components: the Consensus Engine and the Virtual Machine (VM). The VM defines the application-specific behavior of the blockchain and determines how blocks are constructed and parsed to create the blockchain.

3.3.7 Interaction with the Consensus Engine

VMs typically run on top of a Consensus Engine, such as Snowman, which enables nodes in the network to reach agreement on the state of the blockchain. The Consensus Engine provides the underlying mechanism for achieving consensus among the nodes in the network, while the VM defines the rules and operations that govern the behavior of the blockchain. Together, these two components form the backbone of a blockchain system.

Here's an example of how VMs and the consensus engine work together in a blockchain system:

- A node wants to update the state of the blockchain.
- The node's VM sends a request to the consensus engine to update the state.
- The consensus engine requests the block containing the desired state update from the VM.
- The consensus engine verifies the returned block using the VM's implementation of the “Verify” function.
- The consensus engine then asks the network to reach consensus on whether to accept or reject the verified block.
- All virtuous nodes on the network will have the same preference for a particular block.

Depending on the consensus results, the engine will either accept or reject the block. The specific behavior of the VM when a block is accepted or rejected depends on its implementation. The consensus engine will then communicate that decision to the Sender.

In the Metal Blockchain network, the consensus engine is used for every blockchain. The consensus engine relies on the VM interface to handle the creation, parsing, and storage of blocks, as well as the verification and execution of state transitions on behalf of the consensus engine. This separation of concerns between the application layer and the consensus layer allows developers to quickly build their applications by implementing VMs, without having to worry about the consensus layer, which is managed by the Metal Blockchain.

3.4 Subnet Architecture

In the subnet architecture of the Metal Blockchain, the network can be divided into several smaller networks, or subnets, which operate independently of each other. Each subnet is responsible for processing transactions and maintaining its own ledger of data. This allows for parallel processing of transactions, which increases the overall speed and throughput of the network.

Additionally, the subnet architecture of the Metal Blockchain allows for the deployment of different types of consensus algorithms on different subnets. This allows for flexibility and customization within the network, as different subnets can use different algorithms depending on their specific needs.

In the Metal Blockchain network, a subnet is a sovereign network that defines its own rules for membership and token economics. It is made up of a dynamic group of Metal Blockchain validators who work together to reach consensus on the state of one or more blockchains.

Each blockchain is validated by a single subnet, and a subnet can have multiple blockchains. Validators can be members of multiple subnets.

All validators in a subnet must also validate the Primary Network of the Metal Blockchain. This ensures that the entire network is secure and that all subnets are in agreement on the state of the network.

3.4.1 The Primary Network

Metal Blockchain has four built-in blockchains: the Proton Chain (A-Chain), the Platform Chain (P-Chain), the Contract Chain (C-Chain), and the Exchange Chain (X-Chain). These blockchains are validated and secured by all the validators on the Metal blockchain, which make up a special subnet known as the Primary Network.

3.4.2 The Proton Chain

The Proton Chain (A-Chain) allows for the creation and use of smart contracts. It implements the Proton Virtual Machine (PVM), allowing developers to easily deploy Proton-based dApps on the Metal Blockchain. The A-Chain uses the Snowman consensus protocol.

Proton is built to handle payments, decentralized finance, dApps, DAOs, payment messaging (Banks, PSPs, Fintechs) with a higher resource efficiency.

3.4.3 The Contract Chain

The Contract Chain (C-Chain) allows for the creation and use of smart contracts. It implements a modified version of the Ethereum Virtual Machine (EVM), allowing developers to easily deploy Ethereum-based dApps on the Metal Blockchain. The C-Chain uses the Snowman consensus protocol.

3.4.4 The Platform Chain

The Platform Chain (P-Chain) coordinates validators, creates and manages subnets, and allows for individual blockchains (permissioned or permissionless) to launch on the Metal Blockchain. It also enables cross-communication between different internal blockchains. The P-Chain uses the Snowman consensus protocol.

3.4.5 The Exchange Chain

The Exchange Chain (X-Chain) is used to create and transfer digital assets. It allows for peer-to-peer transactions and cross-chain subnet transfers, and it uses the Avalanche consensus protocol to secure the network. It will migrate to the Snowman consensus protocol in the future.

3.4.6 Subnets are independent entities

Subnets in the Metal Blockchain network are independent entities that specify their own execution logic, determine their own fee structure, maintain their own state, facilitate their own networking, and provide their own security.

They do not share execution threads, storage, or networking with other subnets, including the Primary Network. This allows the network to easily scale up, while providing lower latency, higher transactions per second (TPS), and lower transaction costs.

Each subnet has its own unique characteristics and can be customized to suit the needs of the specific blockchain or application it is supporting. This independence and flexibility allows for a wide range of uses and applications on the Metal Blockchain network.

Subnets in the Metal Blockchain network have the ability to define their own token economics, including the use of native tokens and fee markets. They can also launch their own blockchains with customized virtual machines, allowing for a wide range of applications and uses on the network.

This flexibility and customization allows subnets to tailor their operations to suit their specific needs and requirements. It also enables a diverse range of applications and use cases on the Metal Blockchain network, from decentralized finance (DeFi) to gaming and beyond.

3.4.7 Compliance for Subnets

The subnet architecture of the Metal Blockchain makes it easy to manage regulatory compliance. As mentioned earlier, a subnet can require its validators to meet certain requirements, such as being located in a specific country, passing KYC/AML checks, or holding a certain license.

This flexibility allows subnets to tailor their operations to comply with local regulations and requirements. It also enables the creation of subnets that are specifically designed for compliance, making it easy to ensure that transactions on the Metal Blockchain network are conducted in a legal and compliant manner.

It's important to note that the examples provided above do not apply to the Primary Network of the Metal Blockchain.

3.4.8 Application-specific requirements

The flexibility of the subnet architecture in Metal Blockchain allows for the creation of subnets that meet the specific requirements of different applications. For example, a blockchain application may require a large amount of RAM or CPU power to operate effectively. In this case, a subnet could require that its validators have the necessary hardware capabilities to support the application and avoid performance issues.

This ability to customize subnets to meet the needs of specific applications is a key advantage of the Metal Blockchain. It enables the creation of subnets that are optimized for different types of applications, ensuring that they can operate efficiently and effectively on the network.

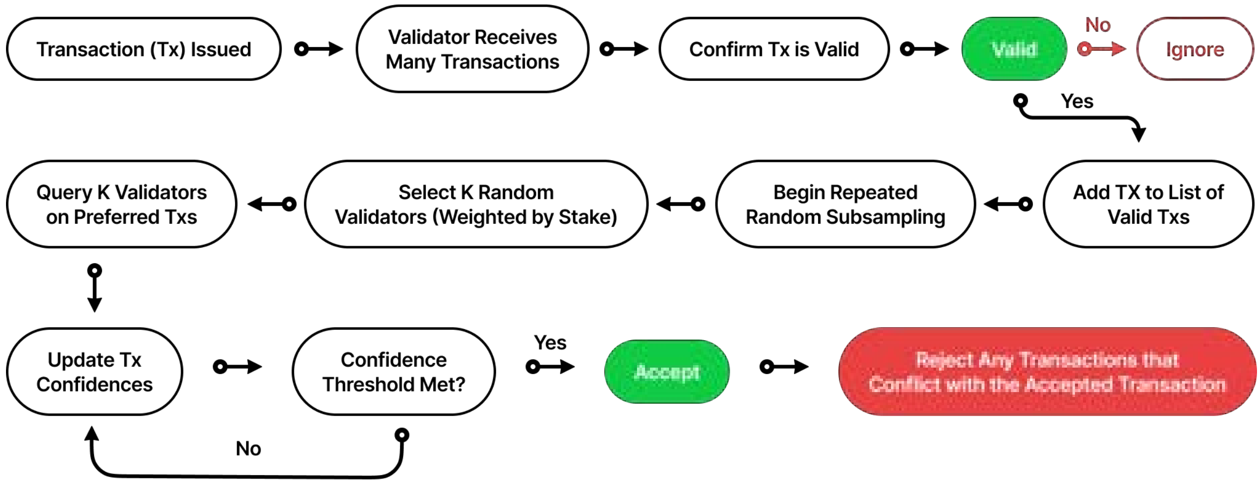
3.4.9 Support for private blockchains

The subnet architecture of the Metal Blockchains allows for the creation of private subnets, where only certain predefined validators are allowed to join. This is useful for organizations that want to keep their information private, as the contents of the blockchains on these private subnets would only be visible to the validators who are members of the subnet.

This ability to create private subnets is a valuable feature of the Metal Blockchain, as it enables organizations to securely and privately conduct transactions and maintain their data on the decentralized network. It also allows for the creation of customized, permissioned networks that can be tailored to the specific needs of different organizations.

3.5 Avalanche Consensus Protocols

Avalanche consensus protocols represent the next major breakthrough in consensus technology, combining the benefits of Nakamoto consensus (robustness, scalability, and decentralization) with the benefits of classical consensus (speed, quick finality, and energy efficiency).



Protocols in the Avalanche family operate through a process of repeated sub-sampled voting. When a validator is trying to determine whether a transaction should be accepted or rejected, it asks a small, random subset of other validators whether they think the transaction is valid. If the validator that is queried thinks the transaction is invalid, has already rejected the transaction, or prefers a conflicting transaction, it replies that it thinks the transaction should be rejected. Otherwise, it replies that it thinks the transaction should be accepted.

If a sufficiently large portion (alpha α) of the validators sampled reply that they think the transaction should be accepted, the querying validator prefers to accept the transaction. That is, when it is queried about the transaction in the future, it will reply that it thinks the transaction should be accepted. Similarly, the validator will prefer to reject the transaction if a sufficiently large portion of the validators reply that they think the transaction should be rejected.

The validator repeats this sampling process until alpha of the validators queried reply the same way (accept or reject) for beta β consecutive rounds.

In the common case when a transaction has no conflicts, finalization happens quickly. When conflicts do exist, honest validators quickly cluster around conflicting transactions, entering a positive feedback loop until all correct validators prefer the same transaction. This leads to the acceptance of non-conflicting transactions and the rejection of conflicting transactions.

It is highly likely (based on the system parameters) that if any honest validator accepts or rejects a transaction, all honest validators will eventually do the same. This guarantee is important for ensuring the consistency and integrity of the blockchain. By using the sub-sampled voting process described above, the protocol is able to reach consensus among the validators in a way that is robust, efficient, and resistant to adversarial behavior.

3.5.1 Why Metal Blockchain adopts the Avalanche Consensus

	Classical	Nakamoto	Avalanche
Scalable	-	+	+
Robust	-	+	+
Highly Decentralized	-	+	+
Low Latency	+	-	+
High Throughput	+	-	+
Lightweight	+	-	+
Green, Sustainable	+	-	+
Resilient to 51% Attacks	-	-	+

Metal Blockchain utilizes the Avalanche consensus protocol (Avalanche & Snowman) since it is designed to be scalable, robust, sustainable and decentralized. It has low latency and high throughput, making it suitable for a wide range of applications. Additionally, it is energy efficient and does not require specialized computer hardware. It is also designed to perform well in adversarial conditions and is resistant to "51% attacks."

The Metal Blockchain however offers a 80% parameterization. This means that in order to initiate a hard fork on the network, a significant 81% validator dominance is required. This approach provides increased confidence and comfort for enterprises and institutions, ensuring a more stable and controlled environment for blockchain governance and updates.

The number of messages that each node has to handle per decision is O(k), and it does not grow as the network scales up, allowing it to scale to millions of validators participating in consensus and achieving truly global scale decentralization for permissionless blockchain systems.

The Exchange Chain (X-Chain) implements the Avalanche consensus protocol on the Metal Blockchain.

3.5.2 Snowman Consensus Protocol

Snowman is a variant and family member of the Avalanche consensus protocol that operates in a linear manner. The key distinction is that each vertex in Snowman can only have a single parent and a single child, unlike in a Directed Acyclic Graph (DAG) structure like the X-Chain.

Snowman is a high-throughput, totally ordered consensus protocol that is optimized for use on blockchain systems. It is powered by the Avalanche consensus protocol and is well-suited for implementing smart contracts.

The X-Chain, currently utilizes the Avalanche Consensus Protocol. However, it will transition to the Snow Consensus Protocol in the future.

Similarly, the P-Chain (Platform) and C-Chain (EVM) on the Metal Blockchain implement the Snowman consensus protocol. Additionally, the A-Chain (Proton) on the Metal Blockchain will adopt and implement the Snowman consensus protocol.
Any Subnet will also implement the Snowman consensus by default.

3.6 Transactions per second

The Metal Blockchain's scalability is achieved through its innovative approach of subnets, with each subnet capable of processing 4,500 transactions per second (TPS) without experiencing chain-splitting issues even during stress tests. This impressive TPS capability allows for a high throughput of transactions on the network.

The Metal Blockchain's design enables an infinite number of subnets to be deployed, theoretically allowing for an unlimited total transactions per second across all subnets. This unique approach to scalability ensures that the Metal Blockchain can handle a massive volume of transactions, making it a highly efficient and scalable solution for decentralized applications and enterprise blockchain deployments.

3.7 Transactional Finality

On the Metal Blockchain, transactional finality is achieved through a fast and efficient consensus mechanism that enables transactions to be confirmed in 0.5 seconds.

3.8 Decentralized, Independent Governance Model

Metal Blockchain employs a decentralized governance model that involves three essential entities: Validators, Delegators, and the Metal Foundation, which we will describe in detail below.

The governance of staker fees, transaction costs, and emission rate is governed by METAL, and can be decided upon by the network.

3.8.1 The Metal Foundation

The Metal Foundation , also known as "The Foundation", is an active member of the Metal Blockchain community, both directly and indirectly, through its grant, support, and other initiatives. The Metal Foundation contributes to the ongoing development, implementation, and maintenance of the Metal Blockchain and its community by supporting the following, among other things:

Developing and implementing different types of software, such as smart contracts, dApps, subnets, APIs, utilities, upgrades, bridges to other blockchains, and wallet software, and assisting others in doing the same.
Staking METAL tokens and operating nodes/validators to help secure the Metal Blockchain.
Creating written, video, and other content on websites, various social media platforms, and elsewhere to educate and engage with the community.
Serving as a resource to the community in various ways to support its growth and development

The Metal Foundation, is comprised of top validators on the network and operates with an open governance system that allows all METAL holders to make proposals and vote. The Foundation conducts its meetings in a transparent manner, with all sessions accessible to the public for listening and viewing. Furthermore, the Foundation serves as the voice of the community and the open-source builders working on the ecosystem, providing funding and support for community-driven initiatives. The Foundation is always composed of an odd number of members, not exceeding five at any given time, and members can be added or removed through internal Foundation votes or external community votes.

3.8.2 Validators

Validators are the heart of the Metal Blockchain ecosystem. Validators are independent organizations that run the open-source MetalGo software to create new blocks/vertices, and process transactions. To achieve consensus, validators repeatedly sample each other. The probability that a given validator is sampled is proportional to its stake.
The primary job of a validator is to allocate computational resources to validate transactions. However, they can also play additional roles in the ecosystem. They can for example serve as local resources to developers and users in their respective communities or offer additional services.

3.8.3 Validator requirements

To participate as a validator on the Metal Blockchain, a minimum stake of 2,000 METAL is required, with a staking duration ranging from 14 days to a maximum of 1 year (365 days).

To ensure network decentralization, each validator has a maximum weight that includes their stake as well as the stake delegated to them. The maximum weight is determined as the lower value between 3 million METAL tokens or 5 times the amount staked by the validator.

This weight limitation prevents validators from creating multiple rogue nodes that could act as delegators and potentially defraud the system through a Sybil attack. For instance, if a user stakes 2,000 METAL to become a validator, they can only be delegated up to 8,000 METAL.

Validators are required to maintain a minimum of 80% uptime during the staking period to be eligible for staking rewards. A validator's uptime directly affects the rewards for both the validator and the delegators. If a validator fails to maintain at least 80% uptime during the staking period, neither the validator nor the delegators will receive rewards. Uptime refers to the percentage of time that a validator's node is operational and actively participating in the network.

In addition to collecting rewards, validators can set their own delegation fee that they charge to delegators for their services. The minimum fee allowed is 2%.

These measures ensure that the Metal Blockchain remains secure, decentralized, and incentivizes validators to maintain high uptime and provide reliable services to the network.
Learn how to become a validator here.

3.8.4 Delegators

Delegators on the Metal Blockchain are individuals who prefer to stake their METAL tokens while maintaining a relatively passive role. They trust an existing validator node by delegating their staked tokens to them.

In return for their support, delegators are rewarded with incentives for their participation in securing the network. This allows users to actively contribute to the ecosystem while entrusting the operational responsibilities to trusted validators, making it a convenient option for those who wish to participate in staking without actively managing their own validator node.

3.8.5 Delegator Requirements

To become a delegator in the Metal Blockchain, a user must stake a minimum of 25 METAL tokens. Just like validators, these staked tokens must be locked for a minimum of 2 weeks and a maximum of 1 year, ensuring commitment and participation in the network.

It's important to note that delegating METAL tokens does not put them at risk, as validators cannot spend the staked METAL tokens. At the end of the locking period, the user will receive their original staked amount along with staking rewards.

It's crucial to carefully choose a validator in the Metal Blockchain ecosystem, as their uptime directly affects the rewards for both the validator and the delegators. If a validator fails to maintain at least 80% uptime during the staking period, neither the validator nor the delegators will receive rewards.

Uptime refers to the percentage of time that a validator's node is operational and actively participating in the network.

Rewards earned by validators are distributed back to delegators proportionally based on the number of staked tokens.

Validators may charge a delegation fee to cover the increased effort they put into managing delegations. This delegation fee can be set by validators, with a minimum fee of 2%. The delegation fee is an essential mechanism to incentivize and compensate validators for their services while ensuring fair participation and rewards for delegators in the Metal Blockchain ecosystem.

Learn how to delegate here.

4. METAL Token

4.1 What is $METAL?

METAL is the native token of the Metal Blockchain, a hard-capped and scarce asset that serves multiple purposes within the ecosystem. METAL is used to pay for transaction fees, secure the platform through staking, and provide a basic unit of account between the multiple subnets created on the Metal Blockchain.

4.2 Fee Burning

To prevent spam and ensure network security, transactions on the Metal Blockchain require the payment of a transaction fee in METAL. The transaction fee is burned, meaning it is destroyed forever, resulting in a reduction of the overall supply of METAL. This fee burning mechanism adds a deflationary element to METAL, contributing to its scarcity.

4.3 Fee Schedule

Transaction fees on the Metal Blockchain vary depending on the type of transaction being performed. The following table shows the fee schedule for different types of transactions:

Chain	Transaction Type	Transaction Fee (METAL)
P	Create Subnet	1
P	Create Blockchain	1
P	Add Validator	0
P	Add Delegator	0
P	Import METAL	0.001
P	Export METAL	0.001
X	Send	0.001
X	Create Asset	0.01
X	Mint Asset	0.001
X	Import METAL	0.001
X	Export METAL	0.001
C	Simple Send	>=001575*

(*) C-Chain gas price can vary.
The Metal Blockchain's C-Chain uses an algorithm to determine the "base fee" for a transaction. The base fee increases when network utilization is above the target utilization and decreases when network utilization is below the target.

4.4 Tokenomics

METAL has a hard-capped supply of 666,666,666 coins. The distribution of METAL is as follows:

Metal Foundation: 142,333,333 METAL
Founders: 71,000,000 METAL
MTL conversion: 120,000,000 METAL
Staking rewards: 333,333,333 METAL

Total max supply: 666,666,666 METAL

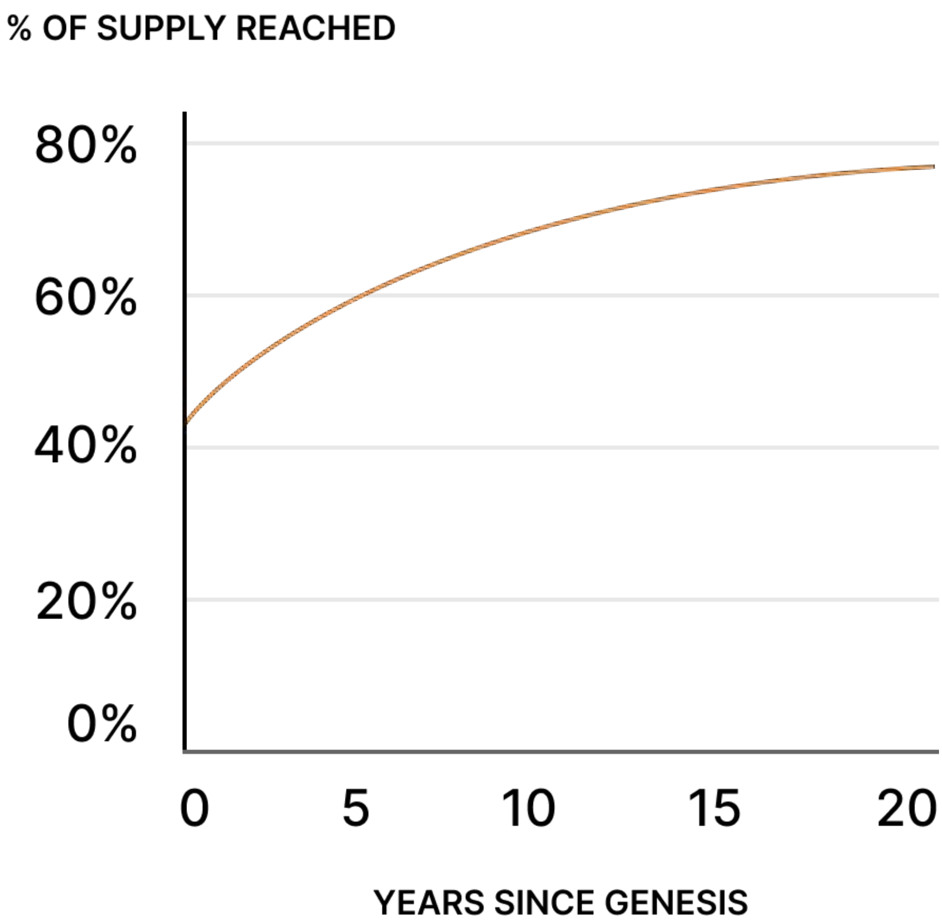
The founders were granted 71,000,000 METAL, which vest over a period of 12 months. The Metal Foundation received 142,333,333 METAL to fund development and accelerate the growth of the network. During the conversion event when Metal Blockchain launched, MTL community members had the opportunity to convert their Metal DAO tokens to METAL coins, with a maximum limit of 60,000,000 MTL that could be converted.

The emission structure of METAL for staking rewards is set to release 333,333,333 coins on a sliding scale, becoming increasingly scarce over a long period of time. These factors combine to create incentives for users to participate in staking and help secure the Metal blockchain.

4.4.1 Staking Rewards emission structure

The emission structure of METAL for staking rewards is designed to release 333,333,333 METAL on a sliding scale, becoming increasingly scarce over a long period of time. The staking rewards are calculated based on a formula that takes into account factors such as the minimum and maximum staking duration, creating incentives for users to participate in staking and help secure the Metal Blockchain. The supply formula for staking rewards is as follows:

(666.6M—333.3M) * (1M / 333.3M) * (10% + 2% * MinimumStakingDuration / MaximumStakingDuration) * MinimumStakingDuration / MaximumStakingDuration



5. More information and resources

Metal Blockchain Website: https://metalblockchain.org
Metal Blockchain Blog: https://metalblockchain.org/blog
Metal Blockchain Whitepaper:
Metal Wallet: https://wallet.metalblockchain.org/
Webauth Wallet: https://webauth.com/
Metal Blockchain Github: https://github.com/metalblockchain/
Metal Blockchain Docs: https://docs.metalblockchain.org/

Token Trackers & Block Explorers

Coinmarketcap: https://coinmarketcap.com/currencies/metal-blockchain/
Coingecko: https://www.coingecko.com/en/coins/metal-blockchain
Block Explorer: https://explorer.metalblockchain.org
Block Explorer C-Chain: https://metalscan.io

Social Media

Twitter: https://twitter.com/metalblockchain
Facebook: https://www.facebook.com/protonxpr/
Reddit: https://www.reddit.com/r/MetalBlockchain/
Telegram: https://t.me/MetalBlockchain
Discord: https://discord.gg/B2QDmgf