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Avalanche L1s

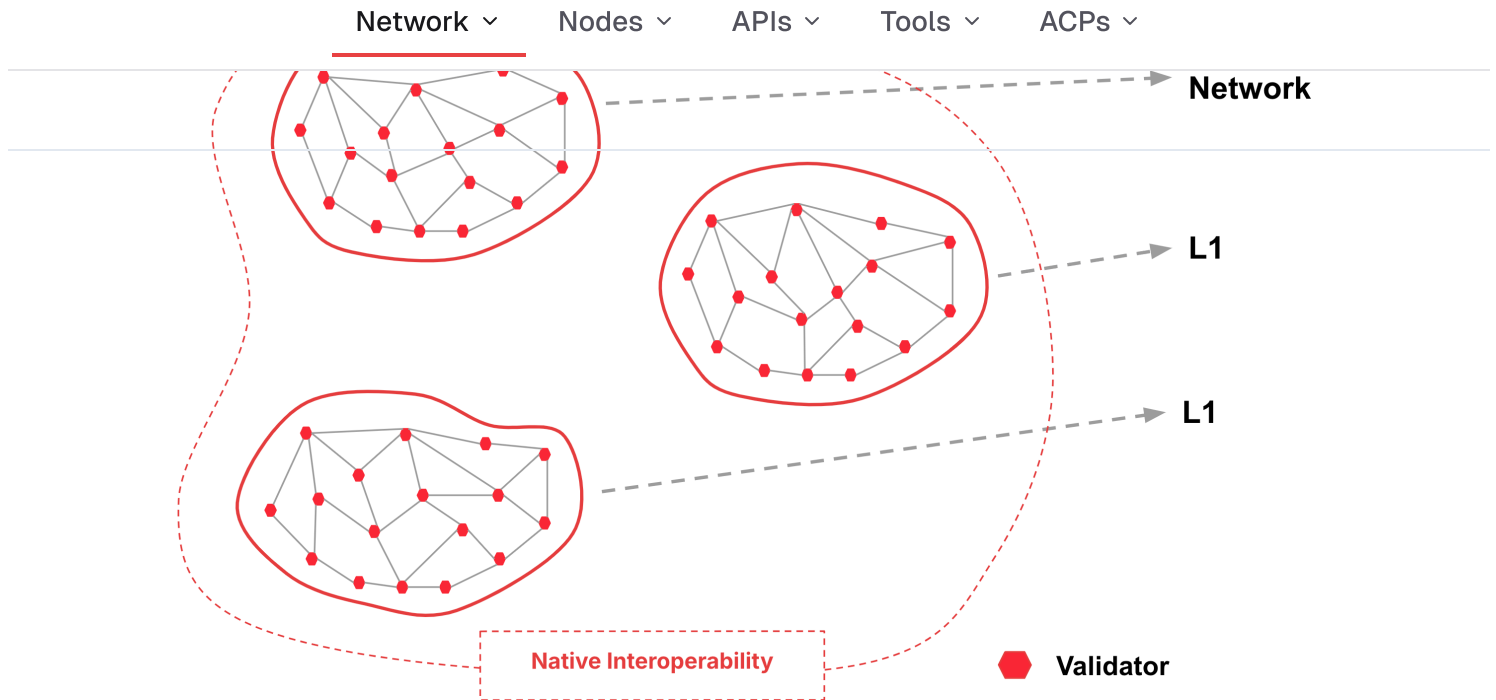
Explore the multi-chain architecture of Avalanche ecosystem.

An Avalanche L1 is a sovereign network which defines its own rules regarding its membership and token economics. It is composed of a dynamic subset of Avalanche validators working together to achieve consensus on the state of one or more blockchains. Each blockchain is validated by exactly one Avalanche L1, while an Avalanche L1 can validate many blockchains.

Avalanche's Primary Network is a special Avalanche L1 running three blockchains:

- The Platform Chain (P-Chain)
- The Contract Chain (C-Chain)
- The Exchange Chain (X-Chain)



**Note**

Every validator of an Avalanche L1 **must** sync the P-Chain of the Primary Network for interoperability.

Node operators that validate an Avalanche L1 with multiple chains do not need to run multiple machines for validation. For example, the Primary Network is an Avalanche L1 with three coexisting chains, all of which can be validated by a single node, or a single machine.

Advantages

Independent Networks

- Avalanche L1s use virtual machines to specify their own execution logic, determine their own fee regime, maintain their own state, facilitate their own networking, and provide their own security.



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and incentives determined by the Avalanche L1 deployer.

- One Avalanche L1 can host multiple blockchains with customized virtual machines.

Native Interoperability

Avalanche Warp Messaging enables native cross-Avalanche L1 communication and allows Virtual Machine (VM) developers to implement arbitrary communication protocols between any two Avalanche L1s.

Accommodate App-Specific Requirements

Different blockchain-based applications may require validators to have certain properties such as large amounts of RAM or CPU power.

an Avalanche L1 could require that validators meet certain hardware requirements so that the application doesn't suffer from low performance due to slow validators.

Launch Networks Designed With Compliance

Avalanche's L1 architecture makes regulatory compliance manageable. As mentioned above, an Avalanche L1 may require validators to meet a set of requirements.

Some examples of requirements the creators of an Avalanche L1 may choose include:

- Validators must be located in a given country.
- Validators must pass KYC/AML checks.
- Validators must hold a certain license.

Control Privacy of On-Chain Data

Avalanche L1s are ideal for organizations interested in keeping their information private.



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Validator Sovereignty

In a heterogeneous network of blockchains, some validators will not want to validate certain blockchains because they simply have no interest in those blockchains.

The Avalanche L1 model enables validators to concern themselves only with blockchain networks they choose to participate in. This greatly reduces the computational burden on validators.

Why Build Your Own Avalanche L1

There are many advantages to running your own Avalanche L1. If you find one or more of these a good match for your project then an Avalanche L1 might be a good solution for you.

We Want Our Own Gas Token

C-Chain is an Ethereum Virtual Machine (EVM) chain; it requires the gas fees to be paid in its native token. That is, the application may create its own utility tokens (ERC-20) on the C-Chain, but the gas must be paid in AVAX. In the meantime, Subnet-EVM effectively creates an application-specific EVM-chain with full control over native(gas) coins. The operator can pre-allocate the native tokens in the chain genesis, and mint more using the Subnet-EVM precompile contract. And these fees can be either burned (as AVAX burns in C-Chain) or configured to be sent to an address which can be a smart contract.

Note that the Avalanche L1 gas token is specific to the application in the chain, thus unknown to the external parties. Moving assets to other chains requires trusted bridge contracts (or upcoming cross Avalanche L1 communication feature).

We Want Higher Throughput



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Avalanche L1 can be single-tenant, dedicated to the specific application, and thus host its own set of validators with higher bandwidth requirements, which allows for a higher gas limit thus higher transaction throughput. Plus, Subnet-EVM supports fee configuration upgrades that can be adaptive to the surge in application traffic.

Avalanche L1 workloads are isolated from the Primary Network; which means, the noisy neighbor effect of one workload (for example NFT mint on C-Chain) cannot destabilize the Avalanche L1 or surge its gas price. This failure isolation model in the Avalanche L1 can provide higher application reliability.

We Want Strict Access Control

The C-Chain is open and permissionless where anyone can deploy and interact with contracts. However, for regulatory reasons, some applications may need a consistent access control mechanism for all on-chain transactions. With Subnet-EVM, an application can require that "only authorized users may deploy contracts or make transactions." Allow-lists are only updated by the administrators, and the allow list itself is implemented within the precompile contract, thus more transparent and auditable for compliance matters.

We Need EVM Customization

If your project is deployed on the C-Chain then your execution environment is dictated by the setup of the C-Chain. Changing any of the execution parameters means that the configuration of the C-Chain would need to change, and that is expensive, complex and difficult to change. So if your project needs some other capabilities, different execution parameters or precompiles that C-Chain does not provide, then Avalanche L1s are a solution you need. You can configure the EVM in an Avalanche L1 to run however you want, adding precompiles, and setting runtime parameters to whatever your project needs.

We Need Custom Validator Management



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be handled directly through smart contracts, giving you programmatic control over validator selection and rewards distribution.

We Want to Build a Sovereign Network

L1s on Avalanche are truly sovereign networks that operate independently without relying on other systems. You have complete control over your network's consensus mechanisms, transaction processing, and security protocols. This independence allows you to scale horizontally without dependencies on other networks while maintaining full control over your network parameters and upgrades. This sovereignty is particularly important for projects that need complete autonomy over their blockchain's operation and evolution.

When to Choose an Avalanche L1

Here we presented some considerations in favor of running your own Avalanche L1 vs. deploying on the C-Chain.

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