AvaCloud Overview

Over the course of blockchain technology's early history, the quest for customizable, efficient, and regulatory-compliant solutions has been a significant challenge for businesses and governments alike. Traditional blockchains have been notoriously slow and expensive to build, often requiring substantial capital and human investment. Additionally, public blockchain networks have frequently fallen short of meeting stringent regulatory requirements around the globe. As the blockchain landscape matures, it is becoming increasingly evident that a one-size-fits-all approach is not the answer.

Scaling via "app-chains" has emerged as a promising solution for this challenge, especially for applications that require a high degree of customization and autonomy. Leveraging Avalanche's Subnets (a version of an application-specific chain), Ava Labs is building highly customizable, enterprise-ready blockchains today with their solution, AvaCloud. With early adopters including AAA game studio Shrapnel, Korean conglomerate SK, and partnerships with financial institutions like Deloitte, T. Rowe Price, and WisdomTree, Ava Labs is poised to bridge the gap between the traditional and blockchain worlds.

Overview of App-chains

An app-chain, in its most basic form, is a blockchain designed for a specific application or protocol that (generally) inherits some or all of its security from a parent chain. This added level of customization offered by an app-chain design, rather than a dApp on sovereign L1, is attractive to founders and developers that may require unique specialization around gas fees, throughput, regulatory compliance, and more.

Both L1 and L2 solutions provide robust frameworks for the development of app-chains. On the Layer 1 side, platforms such as Cosmos SDK and Avalanche Subnets facilitate the creation of app-chains. Layer 2 solutions, including Optimism's OP Stack, Arbitrum's Orbits, Polygon Supernets, and Starknet, also support app-chain development. However, it's important to note that Layer 1 and Layer 2 app-chains cater to different needs and come with their own sets of advantages and challenges.

Layer 1 app-chains offer sovereign security and Miner Extractable Value (MEV) resistance, providing high flexibility and independence. However, they also carry the responsibility of bootstrapping security and maintaining validators, which can be a significant burden. Cosmos, sometimes referred to as "the internet of blockchains," is an L1 protocol that has fully embraced the app-chain design. Cosmos' primary objective is to enhance interoperability among sovereign blockchains through a unique "hub and zone" model, facilitated by the Inter-Blockchain Communication (IBC) protocol. In the Cosmos world, a "zone" is equivalent to an app-chain.

Deploying app-chains is not without its trade-offs. They require a higher degree of maintenance than simple dApps, with concerns about validators, bridges, cross-chain liquidity, composability, and regular upgrades. Despite these challenges, app-chains are ideally suited for projects that demand high-frequency transactions or require a high level of customization and control over their blockchain parameters. They strike a balance between scalability, security, and decentralization, offering a tailored solution for specific needs. Solutions such as Avalanche Subnets and, more specifically, Ava Lab's AvaCloud, look to provide previously unimaginable customization and ease of deployment to the blockchain industry, helping onboard the next wave of blockchain users.

Overview of Avalanche and Subnets

Avalanche (AVAX) is a smart contract PoS blockchain that leverages a novel consensus algorithm and a "heterogenous network of blockchains" architecture to try and offer a more efficient, cost-effective, and high-performance experience compared to the market leader, Ethereum. "Avalanche consensus" proclaims unparalleled scalability and finality within two seconds, a feat yet to be achieved elsewhere in the blockchain space.

The Avalanche Mainnet, launched in the third quarter of 2020, adopts a three-chain approach, comprising the P-, X-, and C-chains, as well as a network of subnets designed for horizontal scaling. This three-chain design along with the subnet network is why Avalanche is a self-described Layer 0 blockchain and "platform of platforms." This innovative design is a strategic move to address the notorious "blockchain trilemma," a term coined to encapsulate the three primary challenges facing blockchain technology: scalability, security, and decentralization.
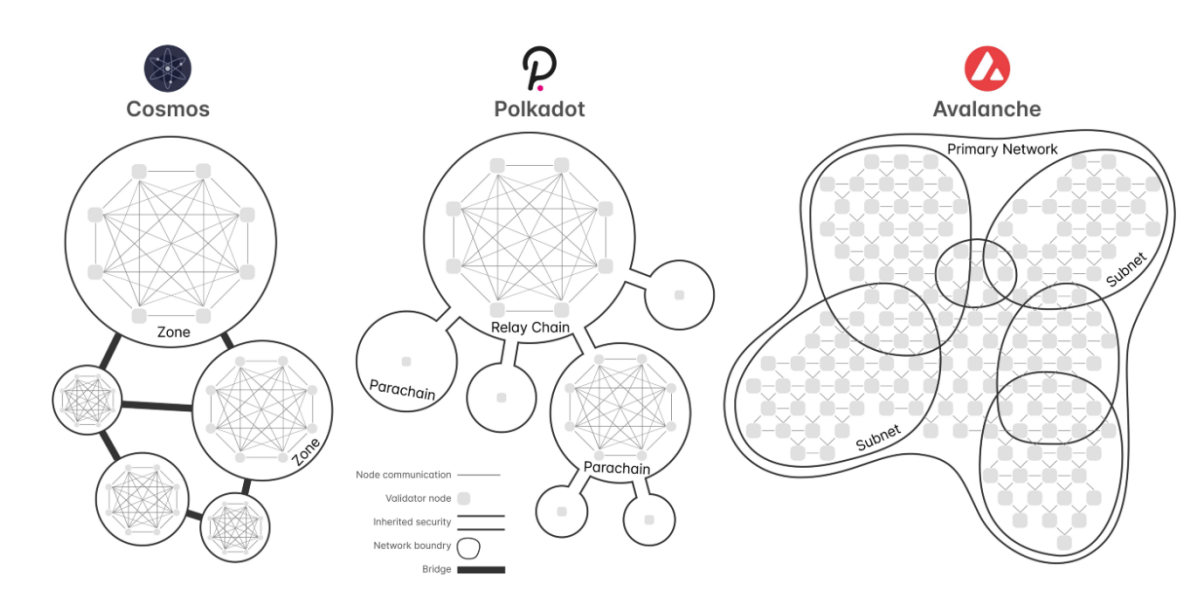

Comparing heterogeneous blockchain networks. Source

Subnets

Subnets are highly customizable, application-specific blockchains within the Avalanche ecosystem. The P-Chain is responsible for all validator and Subnet-level operations, such as the creation of new subnets, the addition of validators to subnets, staking operations, and other

platform-level operations. These subnets, akin to the layer-2 solutions seen in Bitcoin and Ethereum, serve as Avalanche's answer to the scalability challenge.

A subnet, as defined by Avalanche, is a dynamic assembly of validators that reach consensus on a set of blockchains. Within the Avalanche ecosystem, each blockchain is validated by a single subnet, although multiple blockchains can be validated by the same subnet(s). The P-Chain of Avalanche serves a special role as the authority chain that keeps track of all subnets, their chains, and validators.
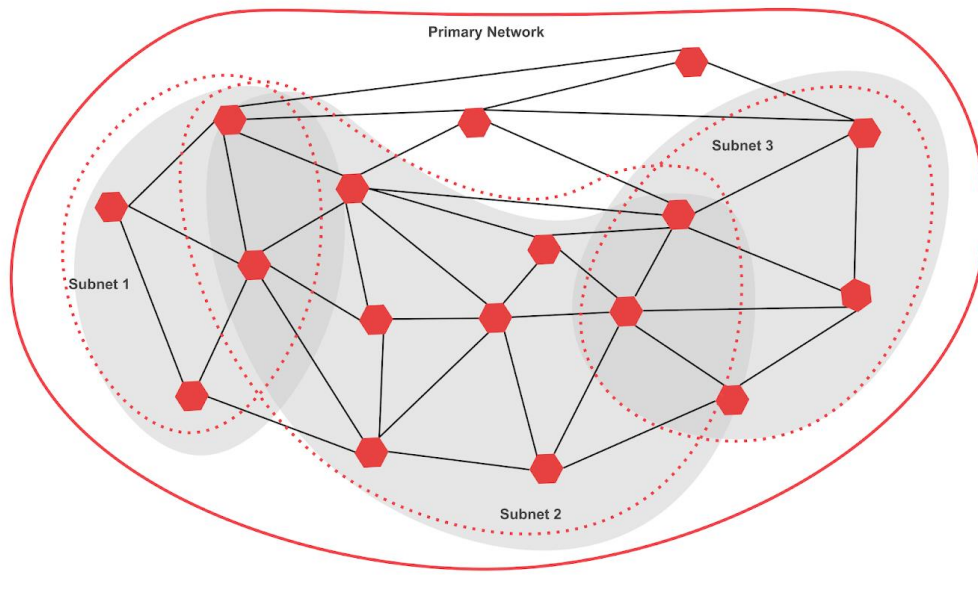
Visualizing Avalanche subnet. [Source](#)

Subnets provide developers with the flexibility and customization necessary to support a broad spectrum of use cases tailored to their specific needs. Unlike other networks that are designed with a single Virtual Machine (VM) in mind, such as Ethereum's EVM, subnets support different VMs like Ava-VM, EVM, WASM, and more, as well as multiple programming languages. The creation of a subnet requires the burning of one AVAX token and the payment of minor additional fees.

A subnet, built under the P-Chain, can validate one or many blockchains with a single validator set. Subnets can set their own virtual machines, programming languages, tokens used, fee structure, validator set limit, KYC requirements, rewards, hardware requirements, validator uptime requirements, slashing penalties, and shared security (optional).

This last point on security is a critical distinction between Polkadot's shared security design and Ethereum's rollups. In Avalanche, subnets are independent chains without shared security, necessitating the bootstrapping of a new consensus network. Avalanche subnets must handle consensus, data availability, and execution internally. This design renders permissionless subnets singular monolithic entities with security guarantees that are less robust than a primary Avalanche chain, similar to Polygon or Skale in Ethereum's ecosystem. However, different security tradeoffs/benefits can be attained via a permissioned Proof of Authority subnet.

Beyond security, another tradeoff involving subnets is the fact that, in addition to supplying their own validators, subnet nodes must also be members of the primary network. These validators may overlap over multiple subnets or be specific to a single subnet. Validating the primary network requires staking 2,000 AVAX, a cost that may be prohibitively expensive for some projects or use cases. However, as of Q3 2023, over 100 subnets are in development on the Fuji Testnet and ~14 custom subnets have successfully launched. One such blockchain, DeFi Kingdom, has recorded processing more gas via transactions than the entire Binance Smart Chain and Polygon networks combined.

AvaCloud

To accelerate real world adoption of Avalanche and blockchain technology, Ava Labs created AvaCloud. AvaCloud is an enterprise solution that allows businesses to quickly and easily create their own customized business blockchain, including the ability to tailor validator requirements, privacy settings, and regulatory compliance. The combination of ease of deployment and customization offered by AvaCloud gives traditional businesses, typically burdened with rigorous regulations and governmental compliance requirements, the tools needed to easily implement blockchain solutions. This opens the door for adoption in traditional finance, compliance with HIPAA, government programs, and beyond.

Enterprise blockchain solutions are not new, and thus, several AvaCloud competitors have been busy building for years, including Hyperledger, R3 Corda, and IBM Blockchain. While these solutions offer some utility and have garnered modest adoption, the key difference with these solutions is that they do not belong to an open and interoperable blockchain network. They are a completely "walled-garden" approach.

AvaCloud, on the other hand, can fully utilize all of Avalanche's public blockchain benefits, including custom Virtual Machines (VMs), subsampling-based consensus, and BLS-signature interoperability, and AVM, giving AvaCloud users the best of both worlds. They can connect to a network of other blockchains, facilitating the sharing of liquidity, information, and value, while also customizing their chain to their specific use case and industry requirements.

AvaCloud is unique in its ability to

1. Provide a level of customization that other chains cannot (build, launch, and maintain a blockchain in minutes with no coding required, pre-set templates from which to choose, and automated updates to reduce maintenance time)

2. Remove the technical barriers associated with launching and maintaining a blockchain protocol with its "no-code" automated blockchain builder

3. Offer customized solutions/templates, like the gasless relayer, from a library of precompiles for quick and easy blockchain building

4. Provide the required tools to build, monitor, and scale an on-chain enterprise

5. Provide a dedicated team of developers and analysts who provide guidance, implementation, and 24/7 customer support

6. Leverage the Avalanche development tool kit and ecosystem, as well as network effects and liquidity

7. Utilize the Avalanche Warp Messaging (AWM) system for frictionless interoperability between other subnets

AvaCloud automates all the necessary components to run a network effectively: validators, data, interoperability, and custom features. This is managed by the user in a user-friendly portal, similar to platforms like Shopify or WordPress. Each blockchain operated through AvaCloud is also supervised and personally managed by the AvaStudios team, a group of highly skilled blockchain experts with diverse backgrounds in engineering, product, and business development.

Real-world Use Cases

One of the first and most obvious use cases for the specific advantages enabled by subnets and AvaCloud is the onboarding of traditional finance (TradFi) onto blockchain rails. One specific [Evergreen subnet](#) entitled "Spruce" is looking to do just that. Spruce is a new testnet/sandbox for institutions to explore the potential of on-chain trade execution and settlement. This testnet provides a platform for both buy-side and sell-side institutions to interact with public blockchain infrastructure in a controlled environment. While this is, for now, simply a testnet with valueless tokens, it provides a safe environment for institutions to understand the system's functionality without the typical risks associated with capital investment in new technology.

Spruce is comprised of financial service giants such as T. Rowe Price Associates, WisdomTree, Wellington Management, and Cumberland. Companies such as these require specific licensing, accreditations, compliance, assurances, and more in order to operate that public blockchain protocols like Ethereum cannot deliver.

Another use case already taking advantage of AvaCloud's benefits is Web3 gaming. AvaCloud offers gaming developers additional functionality to meet specific use cases, including the ability to change/"add-on" features at any point in time, incorporate credit card payments, and alter the in-game tokens/NFTs. Moreover, if a business encounters scaling limitations or wishes to add new features, AvaCloud and Avalanche offer the flexibility to optimize the network.

A core concept of blockchains and their value proposition is that they enable users to self-custody their assets. This can be extended to the world of gaming. Gaming subnets provide players with genuine ownership of in-game items, while simultaneously opening up an additional revenue stream for studios through secondary market royalties. Shrapnel is one such project that is utilizing AvaCloud to construct its custom blockchain in which every item and component within the game is registered on-chain. This comprehensive integration extends to the game's community members, who can create new maps, characters, and items within the game.

Finally, one more creative subnet use case that is in production centers around a private company, user reward/loyalty points, and the power of NFTs. SK, South Korea's second-largest conglomerate with over 200 subsidiaries including SK Hynix, SK Innovation, and SK Planet, recently announced its inaugural blockchain project, UPTN. This project includes the UPTN

Chain, which utilizes the Avalanche Subnet, the OK CASHBAG membership-based NFT project "Road to Rich," and the UPTN Station wallet, a central component within the ecosystem. What makes this SK example so unique is that AvaCloud was able to build a custom gas relayer, enabling gas-free and fee-free transactions for users on the network. This enabled SK to offer its users a mobile app *built on a blockchain* with no need for a cryptocurrency or gas fees. Additionally, now that this template has been built out for SK, future companies can quickly select this gasless relayer template from the AvaCloud library of precompiles, should they choose to.

SK Planet plans to integrate NFTs into the OK CASHBAG membership and introduce a range of services aimed at attracting the younger generation. The project also envisions UPTN Station as a means to secure multiple revenue channels and achieve revenue diversification. In the long run, there is potential to expand into the DeFi space by leveraging OK CASHBAG points.

Conclusion

Since that day ~14 years ago when Bitcoin launched as a simple (yet impenetrable) decentralized transactional ledger, new projects have continued to push the boundaries of what is possible on a blockchain. Avalanche Subnets and AvaCloud are simply a continuation of this trend. They have emerged as a robust and versatile enterprise solution, bridging the gap between traditional business requirements and the innovative capabilities of blockchain. By offering a level of customization and interoperability that distinguishes it from competitors like Hyperledger, R3 Corda, and IBM Blockchain, AvaCloud provides a seamless and user-friendly platform for businesses across various sectors. As businesses continue to discover the benefits of blockchain technology, AvaCloud's unique blend of customization, interoperability, and easy-to-deploy "no code" design positions it as a vital tool in the ongoing integration of blockchain into mainstream business operations.