

# Decentralization Factors for Tokenized Consensus Protocols (Layer 1s and Layer 2s)

Category	Type	Factor	Centralized	Partially Decentralized	Significantly Decentralized	Decentralized
Computation	T & E	<b>Block Creator Concentration</b> – How concentrated is the pool of block creators (validators (measured by US\$ amount staked) or miners (measured by hash power)) for the protocol’s consensus mechanism?	<ul style="list-style-type: none"> <li>Protocol is in testnet phase or, if in mainnet phase, block creation is controlled by the Company.</li> </ul>	<ul style="list-style-type: none"> <li>Majority of block creation power is controlled by independent third parties.</li> <li>Company and Foundation may act as block creators.</li> <li>Block creation may be permissioned.</li> <li>Company and Foundation can likely unilaterally affect a block reorganization (reorg).</li> </ul>	<ul style="list-style-type: none"> <li>Majority of block creation power is controlled by independent third parties that are non-Insiders.</li> <li>Significant number of unaffiliated parties would have to coordinate in order to obtain a majority of the block creation power.</li> <li>If large block creator pools exist, controls are in place at such pools to prevent over-concentration such that the power of the pools is distributed.</li> <li>If block creation is permissioned, permissions are granted by a decentralized process.</li> <li>A block reorg would require significant community participation.</li> </ul>	<ul style="list-style-type: none"> <li>Vast majority of block creation power is controlled by independent third parties that are non-Insiders.</li> <li>A significant number of unaffiliated parties would have to coordinate in order to obtain a majority of the block creation power.</li> <li>If large block creator pools exist, controls are in place at such pools to prevent over-concentration such that the power of the pools is distributed.</li> <li>Block creation is permissionless.</li> <li>A block reorg would require significant community participation and likely be a hotly contested community decision.</li> </ul>
	T	<b>Node Diversity</b> – What different nodes are contributing to the protocol?	<ul style="list-style-type: none"> <li>Small number of nodes operated by the Company, the Foundation, or Insiders.</li> <li>Node operation may be permissioned.</li> </ul>	<ul style="list-style-type: none"> <li>Multiple nodes operated by independent third parties.</li> <li>Small number of nodes crashing would not halt the network.</li> <li>Nodes are located across multiple geographic locations, potentially in multiple continents.</li> <li>Node operation may be permissioned.</li> </ul>	<ul style="list-style-type: none"> <li>Large number of nodes, the majority of which are operated by independent third parties that are non-Insiders.</li> <li>Significant number of nodes would need to crash to halt the network.</li> <li>Nodes are spread across a diverse geographic area including multiple continents.</li> <li>Node operation is permissionless.</li> </ul>	<ul style="list-style-type: none"> <li>Thousands of nodes, the majority of which are operated by independent third parties that are non-Insiders.</li> <li>Nodes are run in dozens of countries around the world.</li> <li>Node operation is permissionless.</li> </ul>

\* There are three different but interrelated lenses through which to view decentralization: *Technical (T), Economic (E), and Legal (L)*. For a more in-depth discussion, [see this article](#).

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Computation	T	<b>Client Diversity</b> – What different clients are being run by nodes to facilitate consensus and execution?	<ul style="list-style-type: none"> <li>Single client developed and maintained by the Company.</li> </ul>	<ul style="list-style-type: none"> <li>One primary client that is open source, likely developed by the Company.</li> <li>Foundation and/or community may contribute to the improvement or maintenance of the client.</li> <li>Additional clients may be in development.</li> </ul>	<ul style="list-style-type: none"> <li>Primary client (if applicable) is maintained by the Foundation and/or community, and is open source.</li> <li>Additional clients may be in development.</li> </ul>	<ul style="list-style-type: none"> <li>Multiple clients are in use and are maintained by independent third parties that are non-Insiders.</li> <li>Additional clients may be in development.</li> </ul>
	T	<b>Diversity of Data Availability</b> – How diverse are the redundancies of data availability?	<ul style="list-style-type: none"> <li>There may be no relevant chain data as the protocol is still in testnet.</li> <li>The Company may maintain and store all relevant data centrally.</li> </ul>	<ul style="list-style-type: none"> <li>Multiple nodes store the state data and historic chain data including several independent nodes.</li> </ul>	<ul style="list-style-type: none"> <li>Many nodes store the state data and historic chain data, the majority of which are operated by independent third parties that are non-Insiders.</li> </ul>	<ul style="list-style-type: none"> <li>There is a robust ecosystem of data availability nodes with a significant number of redundancies operated by independent third parties that are non-Insiders.</li> </ul>
	T & E	<b>Layer 2 (L2) Integration</b> – For Layer 2, is the process of recording transactions to the Layer 1 (L1) and ensuring fraud proof decentralized?	<ul style="list-style-type: none"> <li>Company controls the mechanism (e.g., a relay) for recording of transactions to the L2's L1.</li> <li>Company controls mechanism (e.g., a sequencer) for determining the order of transactions recorded to the L2's L1.</li> <li>Company may run core infrastructure for fraud proofs (e.g., a verifier).</li> </ul>	<ul style="list-style-type: none"> <li>Foundation may control the mechanism (e.g., a relay) for recording of transactions to the L2's L1.</li> <li>Foundation may control mechanism (e.g., a sequencer) for determining the order of transactions recorded to the L2's L1.</li> <li>Foundation and/or community may run core infrastructure for fraud proofs (e.g., a verifier).</li> </ul>	<ul style="list-style-type: none"> <li>Mechanism (e.g., a relay) for recording of transactions to the L2's L1 relies on multiple entities.</li> <li>Mechanism (e.g., a sequencer) for determining the order of transactions recorded to the L2's L1 is reliant on multiple entities.</li> <li>There are multiple redundancies for core infrastructure for fraud proofs (e.g., a verifier).</li> </ul>	<ul style="list-style-type: none"> <li>Mechanism (e.g., a relay) for recording of transactions to the L2's L1 is controlled by a broad, decentralized group.</li> <li>Mechanism (e.g., a sequencer) for determining the order of transactions recorded to the L2's L1 is controlled by a broad, decentralized group.</li> <li>There are many redundancies for core infrastructure for fraud proofs (e.g., a verifier).</li> </ul>
Development	T & L	<b>Completeness of Protocol</b> – Is the protocol fully functional?	<ul style="list-style-type: none"> <li>Protocol may still require significant additions.</li> <li>May not be fully functional.</li> </ul>	<ul style="list-style-type: none"> <li>Protocol is fully functional and includes the features expected at launch of mainnet.</li> <li>Company may have publicly discussed minor upcoming developments or improvements.</li> </ul>	<ul style="list-style-type: none"> <li>Protocol is fully functional and includes all material features publicly discussed by the Company.</li> <li>Company has not promoted upcoming developments or improvements, but industry participants may expect some ongoing contribution from the Company.</li> </ul>	<ul style="list-style-type: none"> <li>Protocol is fully functional and includes all material features publicly discussed by the Company.</li> <li>Company has not promoted upcoming developments or improvements, and industry participants could have no reasonable expectation that material improvements could only be pursued and implemented by the Company.</li> </ul>

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Development	E & L	<b>Ongoing Development</b> – If ongoing development of the protocol is being undertaken, what proportion of such development comes from one entity or a group of related entities?	<ul style="list-style-type: none"> <li>Company is responsible for virtually all of the protocol's ongoing development.</li> </ul>	<ul style="list-style-type: none"> <li>Company is primarily responsible for the protocol's ongoing development, but implementation of such new code is subject to governance/community approval.</li> <li>Additional code is sourced from independent third parties.</li> </ul>	<ul style="list-style-type: none"> <li>Foundation is primarily responsible for coordinating the protocol's ongoing development.</li> <li>Independent third parties are responsible for a majority of new code created for the protocol whether at the direction of the Foundation, community, or otherwise.</li> <li>Implementation of all new code is subject to governance/community approval.</li> </ul>	<ul style="list-style-type: none"> <li>Foundation or community is responsible for coordinating the protocol's ongoing development.</li> <li>Independent third parties are responsible for vast majority of new code created for the protocol at the direction of the Foundation, community, or otherwise.</li> <li>Implementation of all new code is subject to governance/community approval.</li> </ul>
	T & L	<b>Protocol Roadmap</b> – If ongoing development of the protocol is being undertaken, who defines the roadmap of future protocol improvements or expansions?	<ul style="list-style-type: none"> <li>Company is solely responsible for defining the roadmap of the protocol.</li> </ul>	<ul style="list-style-type: none"> <li>Company has completed much of the initial roadmap and the community largely looks to the Company for future developments.</li> <li>Community feedback helps drive Company decisions, but the community itself minimally dictates the roadmap.</li> </ul>	<ul style="list-style-type: none"> <li>Foundation or community primarily drives the roadmap of future developments of the protocol.</li> <li>Company and/or its founders may be influential community members but do not effectively control direction.</li> </ul>	<ul style="list-style-type: none"> <li>Foundation or community entirely drives the roadmap of future developments of the protocol.</li> <li>Company and/or its founders are one of many community members.</li> </ul>
	T	<b>Risk Management</b> – Who is responsible for audits of new code deployments and who is responsible for protocol state monitoring?	<ul style="list-style-type: none"> <li>Company directly hires third parties to perform code audits.</li> <li>Company is primarily responsible for monitoring protocol state and identifying and fixing any hacks, bugs, or irregularities.</li> </ul>	<ul style="list-style-type: none"> <li>Code is public and Company ensures updates are audited before implementation.</li> <li>Public bug bounty programs may be implemented.</li> <li>Company is primarily responsible for monitoring protocol state but independent third parties may also help monitor.</li> </ul>	<ul style="list-style-type: none"> <li>Code is public and the Foundation or community implements code audits for updates.</li> <li>Public bug bounty programs may be implemented.</li> <li>Independent third parties are paid by Foundation or from protocol treasury to monitor the protocol state.</li> </ul>	<ul style="list-style-type: none"> <li>Code is public and the Foundation or community implements audits for new and existing code.</li> <li>Public bug bounty programs may be implemented and payments are honored by governance.</li> <li>Independent third parties are paid by protocol treasury or otherwise incentivized such that non-Company community is primarily responsible for monitoring the protocol state.</li> </ul>

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Development	E & L	<b>Development of Third-Party Protocols</b> – How much third-party developer activity occurs with respect to third-party protocols being built and deployed to the protocol?	<ul style="list-style-type: none"> <li>No fully functional independent third-party protocols have been deployed or only a small number in development by third parties.</li> <li>Smart contract deployment may be permissioned.</li> </ul>	<ul style="list-style-type: none"> <li>Small number of fully functional third-party protocols have been deployed.</li> <li>Large number of third-party protocols in development by independent third parties.</li> <li>Smart contract deployment may be permissioned.</li> </ul>	<ul style="list-style-type: none"> <li>Large number of decentralized and fully functional third-party protocols have been deployed.</li> <li>Large number of third-party protocols in development by independent third parties.</li> <li>Smart contract deployment is permissionless.</li> </ul>	<ul style="list-style-type: none"> <li>Hundreds of decentralized and fully functional third-party protocols have been deployed.</li> <li>Large number of third-party protocols in development by independent third parties.</li> <li>Smart contract deployment is permissionless.</li> </ul>
	E & L	<b>Development of Core Applications</b> – How many of the core applications (wallet, explorer, etc.) for the protocol does the Company control?	<ul style="list-style-type: none"> <li>Company retains 100% control over all core applications (wallet, explorer, etc.) for the protocol.</li> </ul>	<ul style="list-style-type: none"> <li>Company retains control over updates to its own applications (wallet, explorer, etc.).</li> <li>Other competing applications may be operated by third parties.</li> </ul>	<ul style="list-style-type: none"> <li>Core applications are operated by a number of independent third parties, including the Company.</li> </ul>	<ul style="list-style-type: none"> <li>Core applications operated by a number of independent third parties, including the Company.</li> </ul>
	E & L	<b>Ongoing Development Funding</b> – How is ongoing protocol development and third-party protocol development funded?	<ul style="list-style-type: none"> <li>Company may operate an ecosystem fund designed to incentivize third-party development and/or participation.</li> <li>Fund may include cash raised through equity financing or a token sale.</li> </ul>	<ul style="list-style-type: none"> <li>Company has deployed most of its allocated funds to third parties for ongoing development.</li> <li>Small number of third-party protocols are independently financed.</li> <li>Independent ecosystem fund may be operated by the Foundation, community, or an independent third party to incentivize ongoing development.</li> <li>Native token may be awarded by governance mechanism to incentivize some ongoing development.</li> </ul>	<ul style="list-style-type: none"> <li>Large number of third-party protocols are independently financed.</li> <li>Independent ecosystem fund is the only protocol-sponsored funding mechanism for the protocol's ecosystem, including continued development, and is operated by the Foundation, community, or an independent third party.</li> <li>Native token may be awarded by governance mechanism to incentivize some or most ongoing development.</li> </ul>	<ul style="list-style-type: none"> <li>Large number of third-party protocols are independently financed.</li> <li>If any protocol-sponsored ecosystem fund exists, it is directly or indirectly controlled by a highly decentralized governance mechanism.</li> <li>Continued community development is properly incentivized without any centrally managed fund.</li> </ul>
Governance	E & L	<b>Voting Control</b> – Who has the ability to vote and what is the distribution of voting power?	<ul style="list-style-type: none"> <li>Company has 100% control of governance.</li> </ul>	<ul style="list-style-type: none"> <li>Neither the Company or its employees unilaterally control governance (potentially through restrictions on voting under applicable company policies or delegations).</li> <li>Insiders may collectively control governance if acting in concert.</li> </ul>	<ul style="list-style-type: none"> <li>None of the Company, its employees, or its other Insiders unilaterally control governance (assuming no voting restrictions apply).</li> <li>The votes of a number of unaffiliated parties are necessary in order to approve or block any governance proposal.</li> </ul>	<ul style="list-style-type: none"> <li>None of the Company, its employees, or its other Insiders can control or significantly influence governance.</li> <li>The votes of a number of unaffiliated parties are necessary in order to approve or block any governance proposal.</li> </ul>

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Governance	T	<b>Protocol Development Control</b> – Who controls the process for protocol code implementation?	<ul style="list-style-type: none"> <li>Company retains 100% control over code implementation decisions.</li> </ul>	<ul style="list-style-type: none"> <li>Code implementation decisions primarily require governance approval.</li> <li>Company or the Foundation may retain veto/triage power over third-party proposals.</li> </ul>	<ul style="list-style-type: none"> <li>All code implementation requires governance approval.</li> <li>Any veto/triage capability is narrowly structured and held by the Foundation or a distributed group elected by governance.</li> </ul>	<ul style="list-style-type: none"> <li>All code implementation requires democratic approval from governance and/or protocol has limited or no upgradeability.</li> </ul>
	E & L	<b>Functionality Control</b> – What protocol functionality is controlled?	<ul style="list-style-type: none"> <li>Company retains 100% control over functionality of the protocol.</li> </ul>	<ul style="list-style-type: none"> <li>Company retains little to no control of functionality of the protocol.</li> <li>Company may retain control over emergency pause ability.</li> </ul>	<ul style="list-style-type: none"> <li>Company retains no control of functionality of the protocol.</li> <li>Foundation may retain control over emergency pause ability.</li> </ul>	<ul style="list-style-type: none"> <li>Company and Foundation retain no control of functionality of the protocol.</li> <li>Unaffiliated group elected/nominated by the community may retain control over emergency pause ability.</li> </ul>
	E	<b>Significant Influence</b> – Do any stakeholders have significant and outsized power over key decisions?	<ul style="list-style-type: none"> <li>Company has final say over key decisions, including decision-making not subject to governance (i.e., community management, grant programs, etc.).</li> </ul>	<ul style="list-style-type: none"> <li>Company and its founders relinquish control over key decisions but may exert significant influence over such decisions.</li> <li>The Foundation may exert some influence over key decisions.</li> <li>The community may exert limited influence over key decisions.</li> </ul>	<ul style="list-style-type: none"> <li>The Foundation and community exert significant influence over key decisions.</li> <li>Company and its founders continue to exert influence over key decisions.</li> </ul>	<ul style="list-style-type: none"> <li>The Foundation and community exert significant influence over key decisions.</li> <li>Company may have dissolved, or its influence and the influence of its founders may be no greater than other participants in the protocol’s ecosystem – may be viewed as advisors or thought-leaders but not possessing outsized power/control.</li> </ul>
	E	<b>Communications</b> – Who controls the protocol’s social media, community channels, and communications?	<ul style="list-style-type: none"> <li>Company controls all of the protocol’s social media accounts, its community channels, and its communications.</li> </ul>	<ul style="list-style-type: none"> <li>Company may control primary social media accounts and community channels, but additional accounts may be controlled by the Foundation.</li> <li>Company primarily responsible for public communications but Foundation and active community members may promote the protocol.</li> </ul>	<ul style="list-style-type: none"> <li>Foundation or community controls the primary protocol social media accounts and community channels.</li> <li>Majority of public communications are Foundation- or community-driven.</li> <li>Company may have separate social media accounts distinguished from Foundation/ community accounts.</li> </ul>	<ul style="list-style-type: none"> <li>Foundation or community controls protocol social media accounts and community channels.</li> <li>Public communications are largely or entirely community-driven.</li> <li>Company may have separate social media accounts distinguished from Foundation/ community accounts.</li> </ul>

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Value Accrual	E & L	<b>Token Value</b> – What are the sources of value accrual to the tokens of the protocol?	<ul style="list-style-type: none"> <li>The protocol may not have a token; or</li> <li>The protocol may have a token and the Company is the sole source of value accrual (through development, implementation, etc. of the protocol).</li> </ul>	<ul style="list-style-type: none"> <li>If the token has a mechanism for explicit value accrual (gas or sequencer fees paid with token), a majority of on-chain transaction value accrues to the tokens through third-party protocols and related applications.</li> <li>If no explicit value accrual mechanism, Company may be perceived as the primary driver of value.</li> </ul>	<ul style="list-style-type: none"> <li>If the token has a mechanism for explicit value accrual (gas or sequencer fees paid with token), a significant majority of on-chain transaction value accrues to the tokens through third-party protocols and related applications.</li> <li>If no explicit value accrual mechanism, market forces and independent third parties are significant drivers of value.</li> </ul>	<ul style="list-style-type: none"> <li>If the token has a mechanism for explicit value accrual (gas or sequencer fees paid with token), substantially all on-chain transaction value accrues to the tokens through third-party protocols and related applications.</li> <li>If no explicit value accrual mechanism, market forces and independent third parties are the drivers of substantially all value.</li> </ul>
	E	<b>Token Ownership</b> – How concentrated is ownership of the token of the protocol?	<ul style="list-style-type: none"> <li>The protocol may not have a token and Insiders may have contractual right to a future token; or</li> <li>The protocol may have a token and the tokens are held by the Company, affiliates, and Insiders.</li> </ul>	<ul style="list-style-type: none"> <li>Insiders may own a significant portion or even a majority of the outstanding tokens of the protocol.</li> <li>Independent third parties own a substantial number of the outstanding tokens of the protocol (via airdrop, early adopter rewards, token sale, etc.).</li> </ul>	<ul style="list-style-type: none"> <li>Insiders own less than a majority of the outstanding tokens of the protocol.</li> <li>Independent third parties own a significant majority of the outstanding tokens of the protocol.</li> <li>Development funds, staking rewards, and other incentives are in place to continue increasing the disbursed ownership of the tokens of the protocol by independent third parties.</li> </ul>	<ul style="list-style-type: none"> <li>The outstanding tokens of the protocol are widely distributed.</li> <li>No person or group of related persons (including the Company and its employees) holds 20% or more of the outstanding tokens of the protocol.</li> <li>Development funds, staking rewards, and other incentives are in place to continue increasing the disbursed ownership of the tokens of the protocol by independent third parties.</li> </ul>
	E	<b>Outstanding Tokens</b> – What proportion of the tokens of the protocol are outstanding and in circulation as opposed to being locked up (due to contractual agreements) or unreleased?	<ul style="list-style-type: none"> <li>The protocol may not have a token; or</li> <li>The tokens may be issued but are not yet in circulation or are entirely subject to lockups.</li> </ul>	<ul style="list-style-type: none"> <li>A small portion (less than 25%) of the tokens of the protocol are outstanding and in circulation.</li> <li>The tokens of the protocol held by Insiders may be mostly locked up or unvested.</li> <li>Any tokens of the protocol earmarked for an ecosystem fund, staking rewards, or protocol incentives remain largely un-deployed.</li> </ul>	<ul style="list-style-type: none"> <li>A significant portion (at least 33%) of the tokens of the protocol are outstanding and in circulation.</li> <li>A portion of the tokens of the protocol held by Insiders have been vested and released from any applicable lockups.</li> <li>Any tokens of the protocol earmarked for an ecosystem fund, staking rewards, or protocol incentives have been partially deployed.</li> </ul>	<ul style="list-style-type: none"> <li>A majority (at least 50%) of the tokens of the protocol are outstanding and in circulation.</li> <li>A majority of the tokens of the protocol held by Insiders have been vested and released from any applicable lockups.</li> <li>A majority of any tokens of the protocol earmarked for an ecosystem fund, staking rewards, or protocol incentives have been deployed.</li> </ul>

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Value Accrual	E	<b>IP Rights</b> – Who owns any intellectual property (IP) relating to the protocol?	<ul style="list-style-type: none"> <li>Company owns all IP rights relating to the Protocol.</li> </ul>	<ul style="list-style-type: none"> <li>The majority of the protocol’s code is open source, but may be subject to certain use restrictions.</li> <li>Company may hold residual IP relating to the protocol, such as trademarks, domain names, and its proprietary application.</li> </ul>	<ul style="list-style-type: none"> <li>All of the protocol’s code is open source, but may be subject to certain use restrictions (controlled by the Foundation or community).</li> <li>Foundation or community owns most residual IP relating to the protocol, including trademarks.</li> <li>Company may hold residual IP relating to the domain names and its proprietary application.</li> </ul>	<ul style="list-style-type: none"> <li>All of the protocol’s code is open source and can be used/ forked by third parties.</li> <li>Foundation or community owns residual IP relating to the protocol, including trademarks.</li> <li>Company may hold residual IP relating to the domain names and its proprietary application.</li> </ul>
	E	<b>Liquidity</b> – How liquid are the secondary markets for the tokens of the protocol?	<ul style="list-style-type: none"> <li>There is no secondary market for the tokens.</li> </ul>	<ul style="list-style-type: none"> <li>A small amount of liquidity for the token of the protocol is available on secondary markets, but token price and trading volumes remain volatile.</li> <li>Company or the Foundation may be directly funding or incentivizing liquidity by paying market makers or conducting buybacks.</li> </ul>	<ul style="list-style-type: none"> <li>A substantial amount of liquidity for the token of the protocol is available on secondary markets.</li> <li>Company or the Foundation are not directly funding or incentivizing liquidity by paying market makers or conducting buybacks.</li> </ul>	<ul style="list-style-type: none"> <li>A robust and diverse secondary market exists for the token of the protocol.</li> <li>The market for the token is seasoned and is not unduly influenced by any third party.</li> </ul>
Usage, Participation, and Accessibility	E	<b>Protocol Adoption and Participation</b> – How broad is the adoption of the protocol and participation with the protocol?	<ul style="list-style-type: none"> <li>Limited or no adoption.</li> </ul>	<ul style="list-style-type: none"> <li>At least some adoption, but could be concentrated among Insiders or early users.</li> </ul>	<ul style="list-style-type: none"> <li>At least meaningful adoption and usage outside of Insiders and early users.</li> <li>Significant community engagement and participation.</li> <li>Likely one or more protocol-level service provider agreements, such as independent third-party treasury management, provision of custom oracle feeds, or protocol state monitoring.</li> </ul>	<ul style="list-style-type: none"> <li>Network has become a core/ foundational development in its particular ecosystem, with many independent users and contributors.</li> <li>Insiders account for a negligible percentage of usage.</li> <li>Rich and robust community engagement and participation.</li> <li>Likely several protocol-level service provider agreements, such as independent third-party treasury management, provision of custom oracle feeds, or protocol state monitoring.</li> </ul>
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