August 5, 2025

BY EMAIL

Senate Banking Committee
United States Senate
Washington, D.C. 20510

Re: Responses to the Senate Banking Committee's Digital Asset Market Structure Request for Information

Dear Chairman Scott, Senator Lummis, Senator Hagerty, and Senator Moreno:

Thank you for the opportunity to respond to the request for information that the Senate Banking Committee (the "Committee") provided to the public on July 22, 2025 (the "RFI").[1] This letter is written on behalf of Interop Labs, the initial developer of the Axelar Network, a decentralized blockchain interoperability protocol (see Appendix for additional background).

Specifically, we submit this comment letter to highlight observations related to blockchain interoperability and its significance as necessary infrastructure for the future of digital asset markets.

Responses to Specific RFI Questions

23. In a speech on May 12, 2025, SEC Chairman Paul Atkins mentioned the concept of a "super app" that "offers trading in securities and non-securities and other financial services all under a single roof." Is this a sound public policy concept? If so, what, if any, changes should Congress consider to encourage such interoperability amongst different financial services?

In the current financial ecosystem, fragmentation is a persistent challenge. Deeply entrenched intermediaries have built protective barriers – economic and technological "moats" – around their operational domains to maximize value capture for their respective organizations. This siloed structure imposes significant friction across asset classes and market sectors, inhibiting the seamless movement of capital and data and contributing to a fractured financial landscape.

To address this divide, the concept of a unified "super app" has emerged as a compelling solution – capable of integrating a range of financial services into a single user experience. Free market innovation in this new "super app" category would require foundational technologies that are not only interoperable but also composable.

[1] *Digital Asset Market Structure Request for Information* (2025) U.S. Senate Committee on Banking, Housing, and Urban Affairs (https://www.banking.senate.gov/imo/media/doc/market_structure_rfi.pdf)

Composability is a cornerstone of blockchain innovation. As outlined in the *"Strengthening American Leadership in Digital Financial Technology"* report issued by the White House, composability "enables clients or customers to design new or unique financial products using off-the-shelf templates and tools…"[2] This model is analogous to assembling financial services from modular "Lego blocks" – financial primitives that can be reconfigured into novel offerings. Composability promotes liquidity mobility, ensuring that assets are not confined within closed systems but can move freely to where they are most efficiently utilized.

Composability today exists within discrete networks: Ethereum is an example. However, established and incoming market participants are spread across a variety of such blockchain networks. Composability across these networks is impossible without **interoperability** – the mechanism that enables seamless communication and data validation across a multitude of heterogeneous blockchain networks. Interoperability allows for secure, verifiable, and programmable transfer of data and value across discrete systems, thereby eliminating siloed inefficiencies. According to the same White House report, interoperability "enables the secure transfer of data and value across multiple, discrete blockchain environments."

However, not all interoperability is equal; in this response, we focus on **decentralized interoperability.** Decentralized interoperability maintains global standards and availability for interoperability via permissionless networks – open ecosystems characterized by resilience, fault tolerance, and censorship resistance, all maintained through a globally distributed set of operators.

To assess whether an interoperability network can be considered decentralized, the following five principles serve as a guide:

- First, the protocol should be open source, with all core software components publicly accessible and auditable by any interested party.
- Second, the system should be public, meaning that any user, regardless of geographic location or affiliation, is able to access the ledger and observe transaction data in real time.
- Third, the network should be permissionless in its operation – allowing any individual or entity to participate in core functions, subject to transparent rules encoded in the protocol itself.
- Fourth, the ledger should be immutable, ensuring that all transactions are permanently recorded on an append-only blockchain and cannot be retroactively altered or deleted.
- Fifth, the protocol should be operated by a distributed set of economically incentivized participants, with a well-defined incentive structure that aligns the behavior of transaction validators and other operators with the integrity and security of the network.[3]

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[2] *Strengthening American Leadership in Digital Financial Technology* (2025) White House Crypto Working Group (https://www.whitehouse.gov/wp-content/uploads/2025/07/Digital-Assets-Report-EO14178.pdf)

[3] *There Must Be Some Way Out of Here* (2025) Interop Labs; Response to a Securities and Exchange Commission RFI (https://www.sec.gov/files/ctf-written-input-interop-labs-inc-051225.pdf)

From this framework, decentralized interoperability can be further defined by these five operational principles:

- First, such networks must be non-custodial, meaning control of software components that hold user assets must reside with diverse operator nodes, within the network.
- Second, participation in network operation – such as message transfer or governance – must be permissionless, i.e., open to the public under transparent and objective criteria.
- Third, the codebase must be open source, allowing any party to inspect, replicate, or improve the underlying software.
- Fourth, the network should record all relevant transaction data immutably on a blockchain, ensuring auditability and accountability.
- Fifth, network governance processes must be distributed and transparent.[4]

For decentralized interoperability and composability to yield their full potential, the infrastructure must also be **programmable**. Programmability allows developers and users to encode rules that govern the secure storage and transfer of assets. Additionally, regulators can leverage the programmable layer to implement oversight and compliance mechanisms tailored to emerging standards.[5] This allows innovators to compose "super apps" that integrate multiple financial services in a unified user experience.

While market dynamics will ultimately determine the commercial viability of a super app, proactive support from this Committee in advocating for composability and decentralized interoperability as core legislative goals can lay the groundwork for widespread innovation. By doing so, we can ensure that such technologies serve the broadest public interest and unlock the full benefits of next-generation financial infrastructure.

32.Should legislation encourage interoperability or the development of interoperability across different layer-1 blockchain networks? If so, how?

Yes, legislation should encourage government agencies to actively *adopt and recommend* open interoperability standards across different layer-1 blockchain networks – however, legislation should not *mandate* such standards. As demonstrated by the diverse innovations emerging from various blockchain ecosystems, enabling seamless interaction between these networks can foster new use cases, enhance user experiences, and catalyze further technological advancement.

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[4] *Ibid*.

[5] For a broader discussion on ways for regulators to work with interoperability layer, see *Programmable Interoperability: The Key to Standardization in Regulating Tokenized Assets* (2024) Jason Rozovsky (https://www.elevandi.io/hubfs/Programmable%20Interoperability%20-%20The%20Key%20to%20Standardisation%20in%20Regulating%20Tokenized%20Assets%20-%20July%202024_Final.pdf)

A useful parallel can be drawn from the early evolution of the internet. Early interoperability technologies included proprietary offerings from the likes of Apple, Digital Equipment Corporation, IBM, and Xerox. These proprietary networks sought to lock in customers, creating a coordination failure, which delayed the internet's early growth.[6] Government agencies' adoption and endorsement of an open interoperability protocol, TCP/IP, was a decisive factor in its ultimate, widespread adoption, which became a critical step toward unlocking the internet's full potential. TCP/IP served as a universal communication standard, enabling diverse systems to interoperate and scale globally.

Wisely, these government agencies did not dictate use of TCP/IP. Rather, they encouraged it by adoption and education. In particular, one agency stood out as a model for effective standards promulgation in the early days of the internet: the National Science Foundation (NSF).

In 1985, the NSF specifically tackled the coordination problem, helping develop a public internet backbone known as NSFNET, using the open TCP/IP suite. By adopting TCP/IP, the NSF helped standardize internet infrastructure and open it to innovation.[7]

In addition, the NSF helped fund projects like the Internet Engineering Task Force (IETF). This proved valuable in the early days of TCP/IP, as early IETF participants avoided royalty-bearing technology and built early implementations using the openly available TCP/IP documentation. These implementations became the foundation for data communications curricula in computer science education.[8]

This foundational adoption and promotion at the early stages of the internet itself demonstrates the value of a "light-touch" regulatory approach. Government adoption and encouragement helped foster innovation and overcome coordination failures by adopting and promoting the non-proprietary TCP/IP as a universally available interoperability protocol.

Just as the internet's success hinged on open standards and interoperability, blockchain-based systems require similar principles to achieve global scale and composability. Regulators should adopt a similarly restrained approach when supporting standards for open or permissionless interoperability in blockchain infrastructure.[9]

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[6] *Coordination and Decommissioning: NSFNET and the Evolution of the Internet in the US, 1985-95* (2023) Kazumori, Eiichiro; Stanford U. Discussion Paper (https://siepr.stanford.edu/publications/working-paper/coordination-and-decomissioning-nsfnet-and-evolution-internet-united)

[7] Kazumori, *op. cit.*

[8] *Request for Information: Effectiveness of Federal Agency Participation in Standardization in Select Technology Sectors* (2011) Computer and Communications Industry Association ()

[9] Interop Labs and OpenZeppelin have worked with other industry leaders to create ERC-7786, an open and accessible interoperability standard for Ethereum with the support of the Ethereum Foundation. For more information, see www.ERC7786.org

Importantly, such standards should prioritize non-custodial network architectures. These enable decentralized interaction, enhance security and user control, and support the composability required for a robust and inclusive global blockchain ecosystem. (This recommendation aligns with the position we presented in our response to the SEC's Request for Information.)[10]

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Thank you for your attention to this matter. We are prepared to discuss these recommendations further and provide any additional information the Committee may need.

Sincerely,

Jason Rozovsky
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Interop Labs Inc.

cc: Sergey Gorbunov
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[10] Interop Labs, *op. cit.*

Appendix

Axelar Network Background

The Axelar protocol was founded by Sergey Gorbunov and Georgios Vlachos in 2020[11] and launched in 2022.[12] The primary objective of the Axelar Network is to use the Axelar protocol to enable decentralized interoperability among blockchain systems. Just as institutions and enterprises have historically encountered vendor lock-in with legacy IT systems, they aim to avoid replicating such limitations in modern blockchain environments. Interoperability ensures that there is no necessity to select a single blockchain, thereby preventing constraints on accessing other ecosystems.

The Axelar Network has several key architectural features. First, it incorporates decentralized protocol characteristics similar to bitcoin. It is:

1. Open source.
2. Public.
3. Permissionless.
4. Immutable.
5. Operated by economically incentivized validators.

Second, Axelar is designed to support cross-chain message transfers, referred to as general message passing (GMP). These messages can encompass a wide array of functions, including contract calls and arbitrary data payloads such as token transfers (both "lock and mint" and "burn and mint"), governance votes, oracle updates, or application-specific instructions between blockchains.

Third, the Axelar Network records and publishes all cross-chain message transfers on an immutable blockchain, making all transfer information publicly accessible and visible. This includes information pertaining to the type of message, originating address, destination address, time of transfer, amount of transfer, and all associated fees (e.g., gas fees).

Fourth, the Axelar Network consists of a blockchain and is operated by a dynamic set of 75 validators. All cross-chain transactions are published by this set, and all cross-chain information is publicly accessible, with the blockchain recording each transaction's relevant information. Ownership of all gateways and contracts on the network is sharded (i.e., divided), distributed among and controlled by the 75 validators. Validators are incentivized to follow

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[11] Sergey earned his B.Sc. and M.Sc. in computer science from the University of Toronto, and his Ph.D. in cryptography from the Massachusetts Institute of Technology. He was a professor of cryptography at the University of Waterloo and a member of the founding team at Algorand. Georgios earned his B.Sc. and M.Sc. in computer science from the Massachusetts Institute of Technology and was also a member of the founding team at Algorand.

[12] *Axelar: Connecting Applications with Blockchain Ecosystems* (2021) Interop Labs (https://www.axelar.network/whitepaper)

protocol rules through both token rewards received from the protocol and slashing penalties in the event of misconduct.

Fifth, governance decisions for the Axelar Network are made by all tokenholders. This includes all modifications to the Axelar protocol, and governance over both validators of Axelar Network's core protocol and "Verifiers" for Interchain Amplifier connected networks. Tokenholders vote on changes to the Axelar Network through transparent, on-chain voting. Importantly, all actions in connection with transaction validation are subject to *quadratic voting* to ensure equitable control distribution. Specifically, voting power is tied to the square root of the total stake delegated to a validator. This mechanism significantly reduces the likelihood of any single entity or colluding entities accumulating sufficient stake to gain control over the network.[13]

Sixth, Axelar Network provides for a programmatic layer to sit atop the protocol. This allows for complex smart contracts to execute based on information received from multiple blockchain networks.

Seventh, the Axelar Network uses a *hub-and-spoke* structure. Instead of connecting blockchains bilaterally (each chain to every other chain individually), a blockchain only needs to connect to the Axelar Network, gaining access to all other connected blockchain networks.

[13] Axelar Network operates a delegated proof of stake blockchain, which allows tokenholders to delegate their stake to validators without relinquishing ownership.