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The Policy and Legal Implications of Inclusion Lists

Preserving a Credibly Neutral System for Global Adoption

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Preserving a Credibly Neutral System for Global Adoption

Authors:

Khushi Wadhwa (Predicate)
Nikhil Raghuveera (Predicate)
Jane Khodarkovsky (Advisor to Predicate, Partner at Arktouros pllc).

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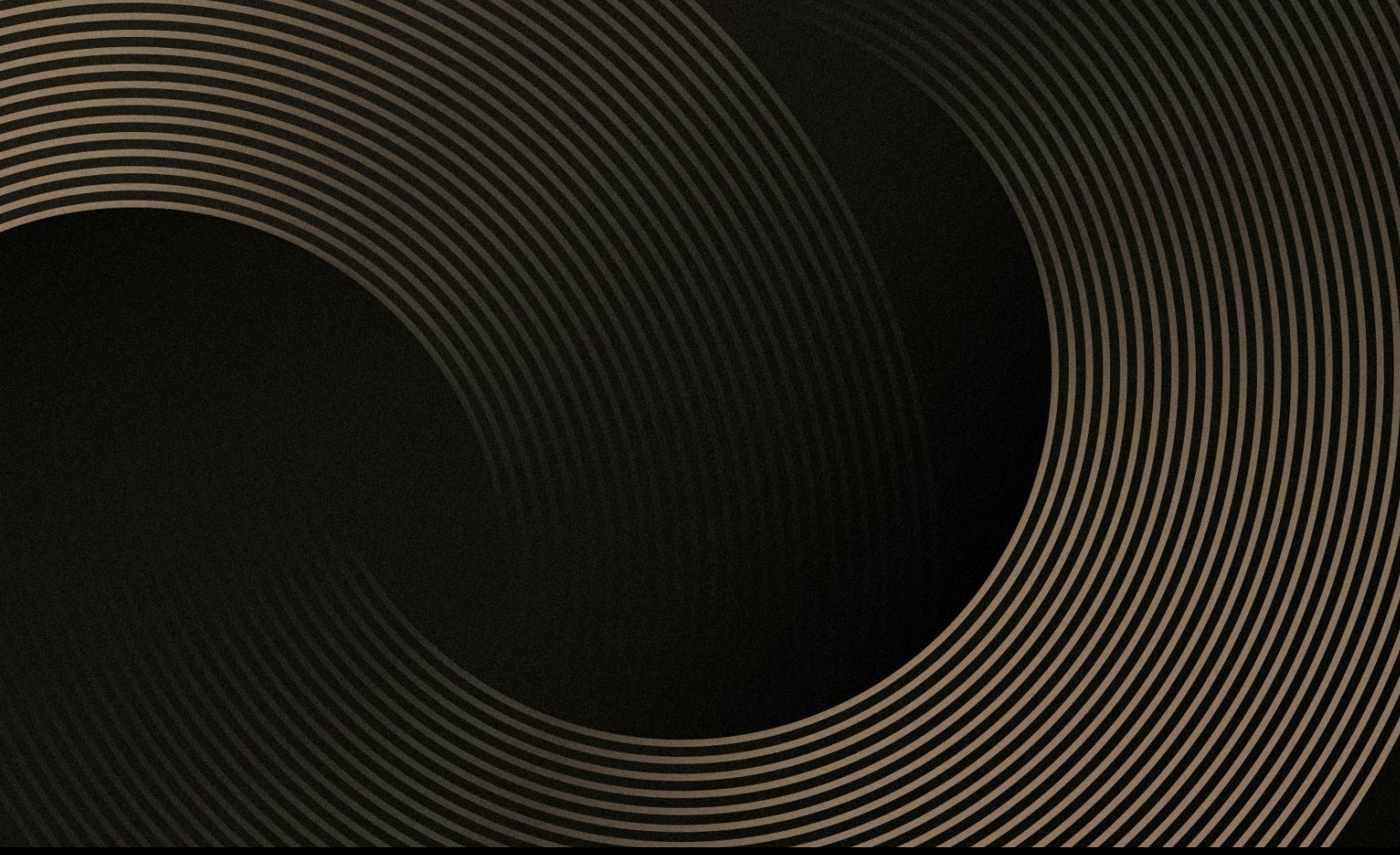


Introduction

Introduction

Censorship resistance is a core value proposition of Ethereum. The network is designed to be open, permissionless, trustless, and decentralized. However, censorship can occur at different points of the infrastructure stack via builders, relays, and proposers. Builders can censor transactions by building blocks that exclude specific transactions, relays can programmatically prevent the dissemination of blocks containing certain transactions, and proposers can censor by only presenting blocks with transactions they want to include in the network.

Inclusion lists have been proposed as a mechanism to enhance Ethereum's censorship resistance by allowing proposers to specify transactions that must be included in the next block. This paper explores the policy and legal implications of implementing unconditional inclusion lists on Ethereum. We examine two contrasting scenarios: one in which inclusion lists reinforce Ethereum's credible neutrality, thereby shifting regulatory scrutiny to more appropriate parts of the stack, and another where they may invite increased regulation by portraying Ethereum as less neutral. Understanding these potential outcomes is crucial for the Ethereum ecosystem when considering inclusion lists and the broader discourse around appropriate and thoughtful regulation in this space.

Context

Context

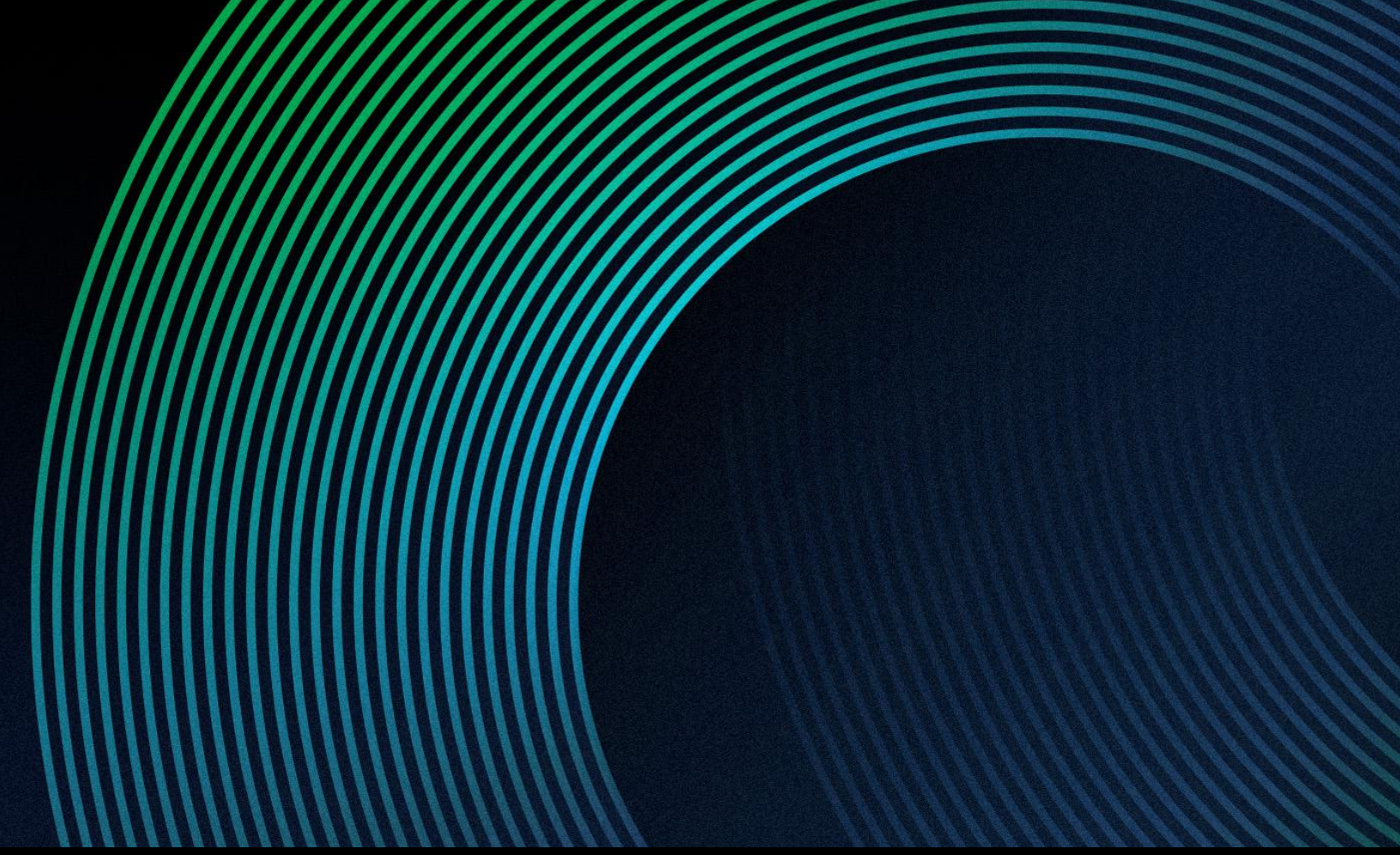
Censorship resistance is a core value proposition of Ethereum. The network was originally designed to be permissionless, trustless, and decentralized. However, censorship can occur at different points of the infrastructure stack by builders, relays, and proposers. Builders can censor transactions by building blocks that exclude specific transactions, relays can programmatically prevent the dissemination of blocks containing certain transactions, and proposers can censor by only presenting blocks with transactions they want to include in the network.

In the context of Ethereum, censorship broadly refers to the ability to restrict available information or, as it relates to the base layer, the inability to report a transaction. The term "transaction" encompasses a wide range of both financial and non-financial interactions, such as cross-chain messaging for transferring data between different blockchain networks, attestations to verifiable credentials like digital identities or proofs of qualification, and onchain gaming where in-game actions are recorded as onchain data.

Discussions about censorship resistance have intensified since the U.S. Office of Foreign Assets Control (OFAC) added smart contract and wallet addresses (including ETH addresses) to the Sanctions List, and Tornado Cash founders were charged with money laundering and sanctions violations related to the development of Tornado Cash. Over the last 30 days (as of Oct 8, 2024), relay censorship of OFAC-sanctioned addresses has been approximately 55%, while block builder censorship has been around 4%. Currently, 98% of all blocks produced via MEV-Boost come from only three block builders.

Inclusion lists are designed to enhance the censorship resistance of Ethereum by allowing proposers to specify a set of transactions that must be included in the next block. This paper explores the policy implications of the unconditional inclusion list design. Unconditional inclusion lists force block builders and relays to include specified transactions in their blocks if they want them to be accepted into the network, effectively preventing censorship at these levels. Additionally, this design seeks to minimize proposer censorship by enabling each proposer to set a list of transactions that the next proposer must include in their block.

The introduction of inclusion lists to the Ethereum network has the potential to significantly impact the perception of its credible neutrality, leading to various policy and legal implications. This paper explores two contrasting scenarios that could result from the implementation of unconditional inclusion lists. In the first scenario, inclusion lists may reinforce Ethereum's decentralization and neutrality, shielding the base layer from regulatory scrutiny and redirecting attention to the application layer. Conversely, the opinionated nature of inclusion lists could portray Ethereum as less credibly neutral, increasing regulatory scrutiny on infrastructure providers.



Inclusion List Architecture

Inclusion List Architecture

The Ethereum blockchain has undergone significant architectural changes since its inception, continually evolving to improve scalability, security, and decentralization. Often, these changes are battle-tested as out-of-protocol solutions that eventually become enshrined in the network. Proposer-builder separation (PBS) is one of those solutions, with approximately 90% of all Ethereum validators using Flashbots' MEV-Boost as a tool for out-of-protocol PBS.

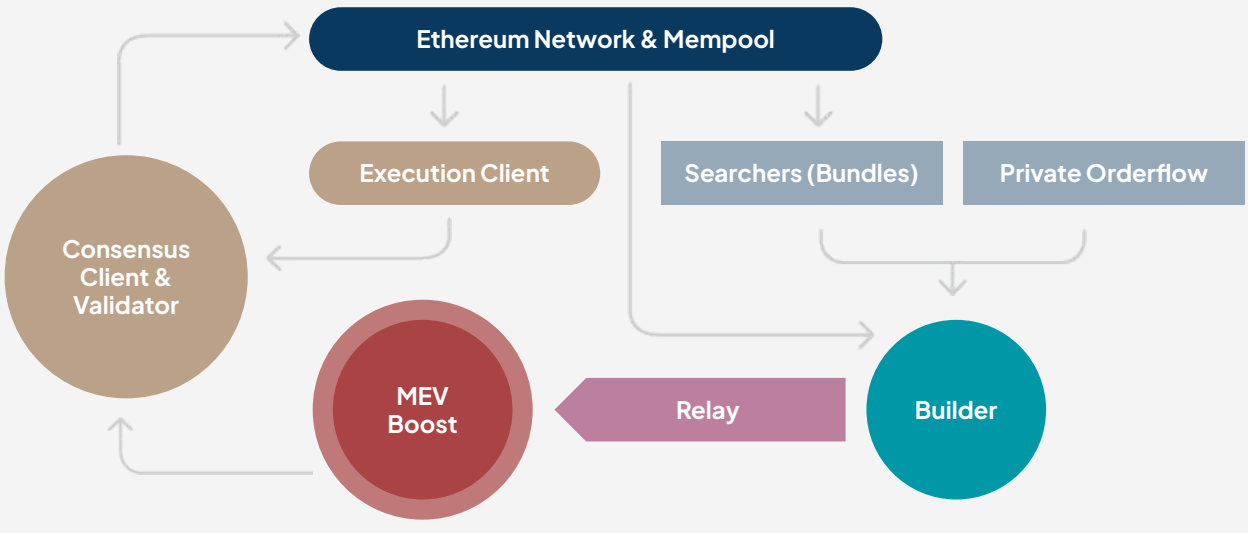
Proposer-Builder Separation

PBS decouples the roles of block construction (the builder) and block proposing (the proposer). Specialized builders focus on optimally ordering transactions and generating profitable blocks, while proposers are pseudo-randomly selected to validate and propose these blocks for inclusion into the network.

This separation of powers aims to improve Ethereum's maximum extractable value (MEV) redistribution.

The key players in the PBS ecosystem include:

- **Searchers:** Construct bundles of transactions for builders to include in blocks.
- **Block Builders:** Construct blocks from transaction order flow, including bundles from searchers or public/private transactions from users.
- **Relays:** Intermediaries that securely store blocks received from builders and provide the most profitable block to validators.
- **Proposers/Validators:** Ethereum network participants are selected to validate blocks received from a relay and propose them for inclusion into the network.



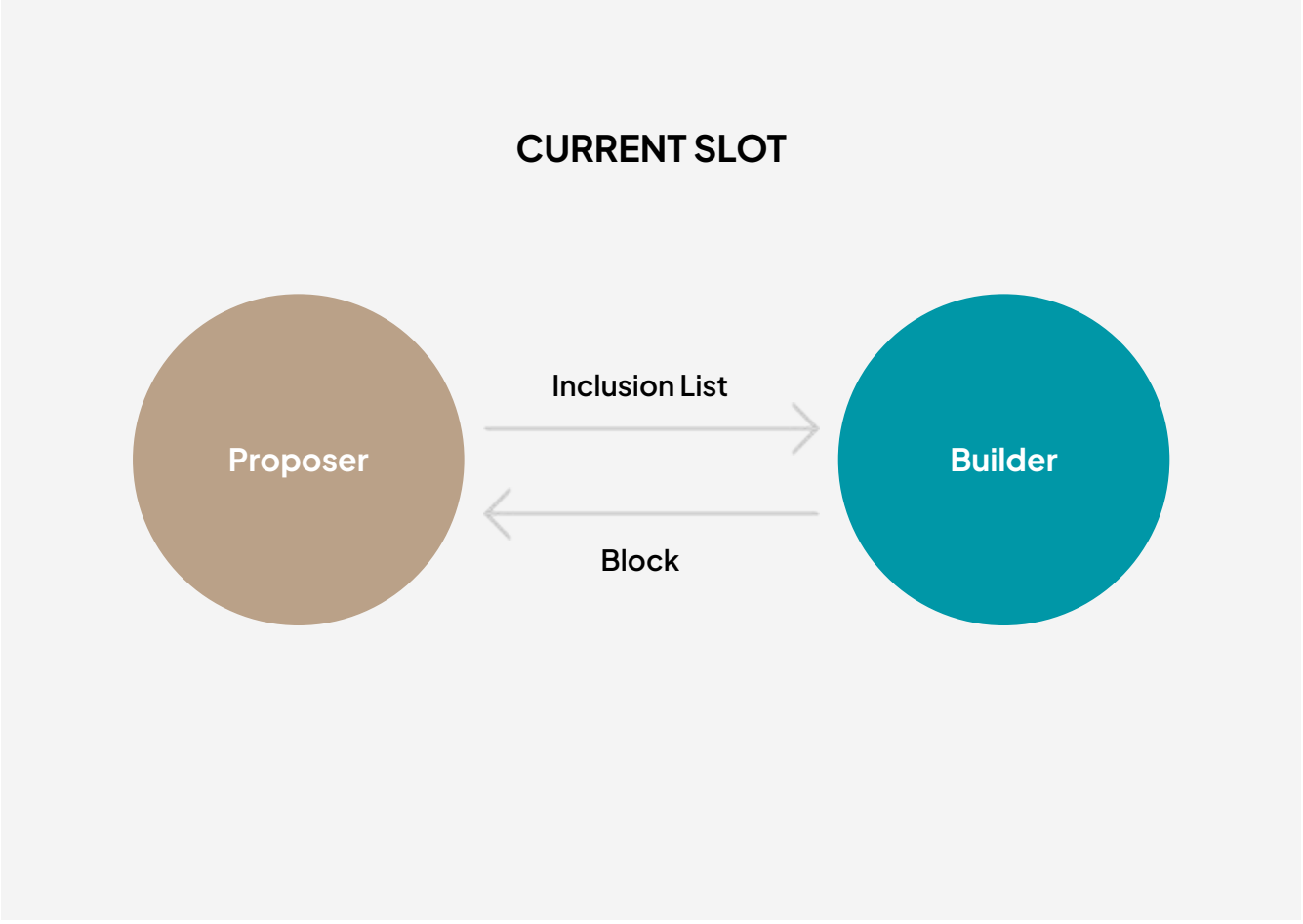
FLASHBOTS MEV-BOOST IMPLEMENTATION

Currently, the most prominent implementation of PBS is Flashbots' MEV-Boost, in which relays coordinate the PBS process out-of-protocol. However, plans to enshrine PBS (ePBS) into the Ethereum architecture have been proposed and are being researched. The concept of ePBS aims to address centralization by incorporating PBS natively into Ethereum's consensus layer, thereby eliminating the need for external relays.

Unconditional Inclusion List Design

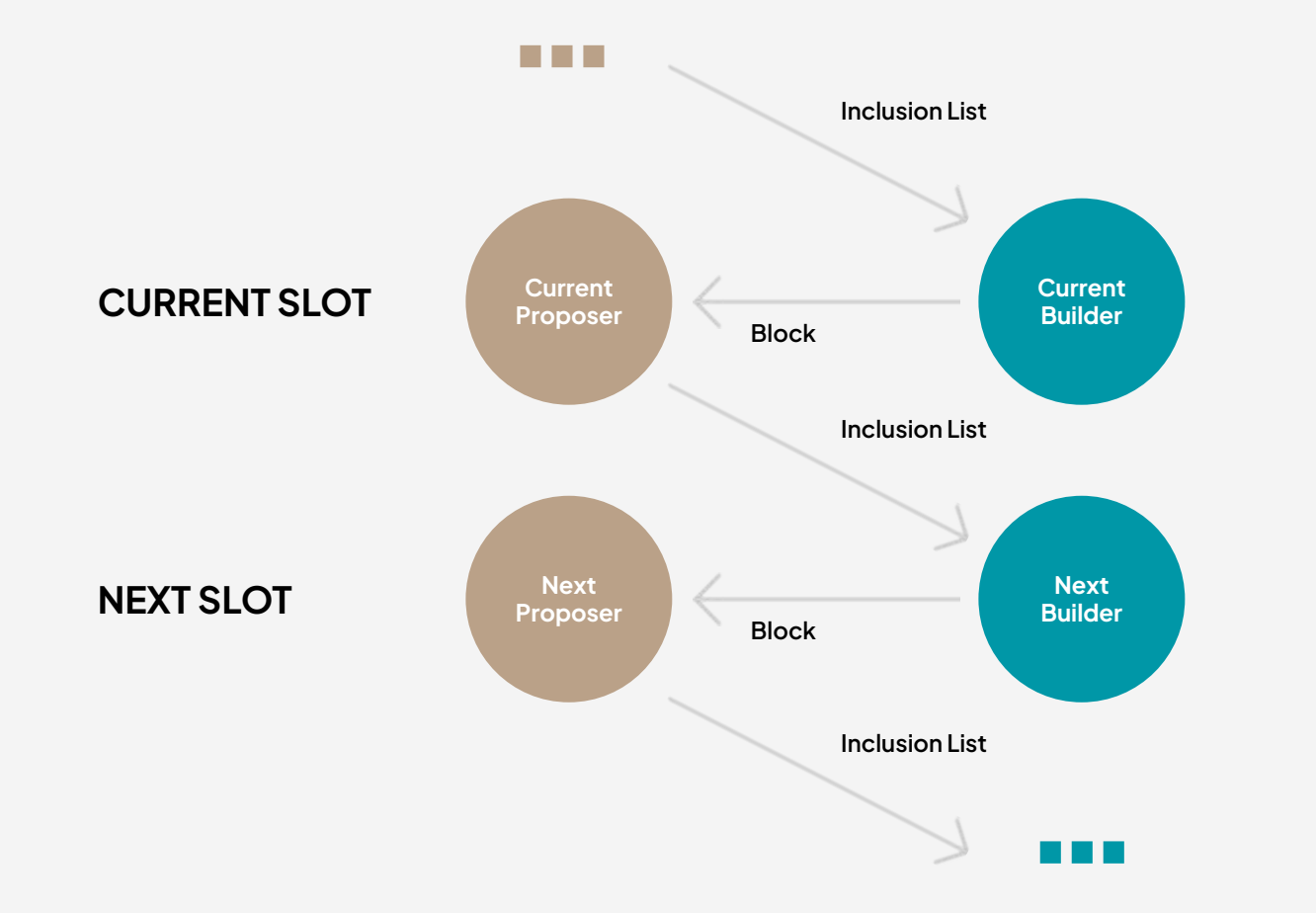
The latest Ethereum Improvement Proposal to add inclusion lists into Ethereum (EIP-7547) is based on the design of unconditional inclusion lists. Currently, when a validator is selected to propose a block for a given slot, the validator can include any pending transactions it wants in that block. However, with PBS, most proposers outsource the full block construction to block builders.

The simplest idea for inclusion lists would be to allow the proposer for the current slot to specify a set of transactions that the builder must include when constructing the block for that slot. However, this design is not incentive-compatible; if proposers place too many constraints on builders, the builders can simply refuse to construct blocks out of alignment with natural market incentives.



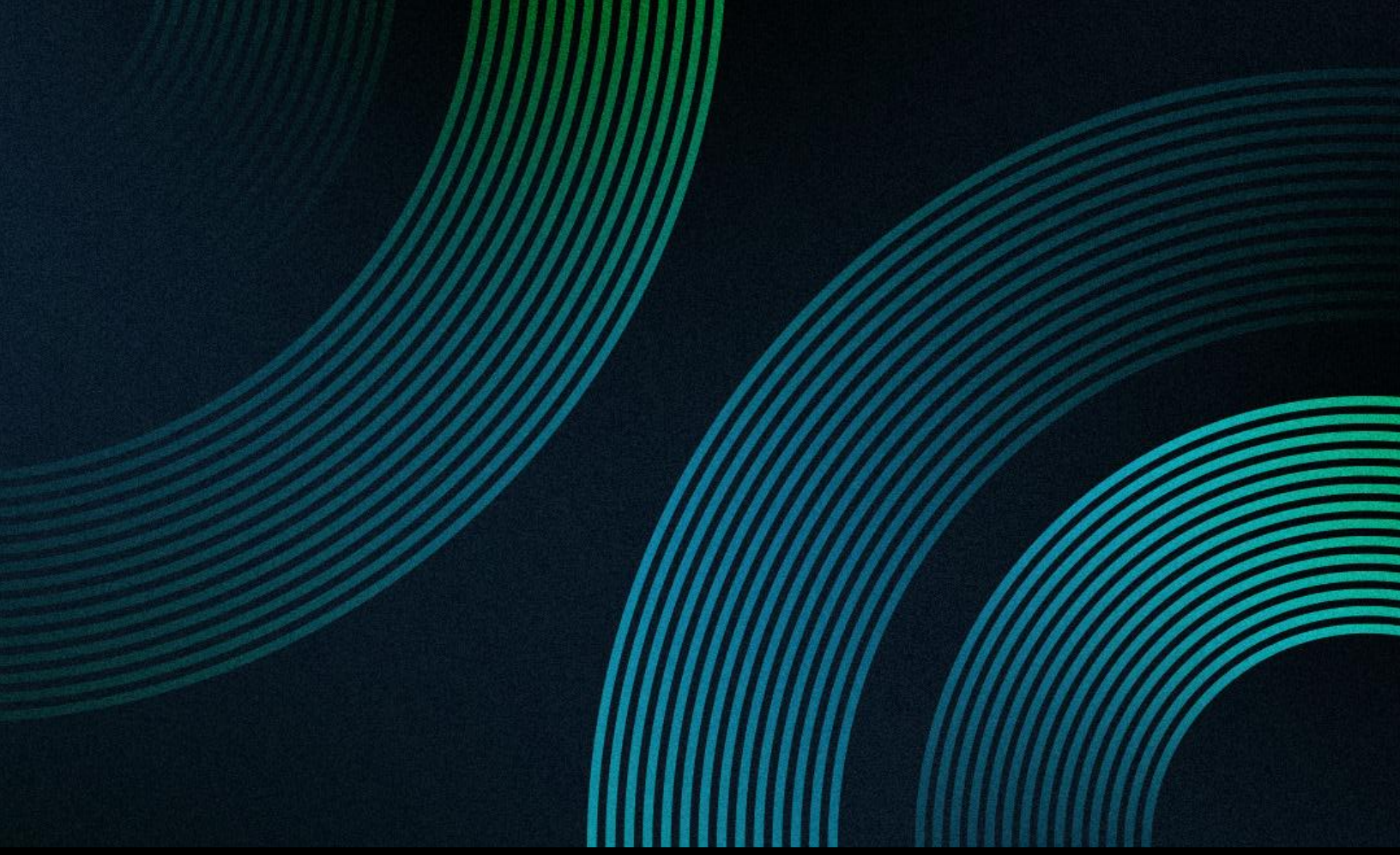
To avoid this, Ethereum researchers proposed a variation of inclusion lists. Instead of the current proposer's inclusion list applying to their slot, the inclusion list actually specifies transactions that must be included in the block for the next slot; a different proposer/builder pair constructs the transaction.

This allows the current proposer to put some guardrails around transaction inclusion while not directly constraining the block builder for their own slot's block. The builder for the next slot is still incentivized to follow the previous slot's inclusion list, as failing to do so would make their block invalid for that slot.



Inclusion lists remove the block builder's ability to censor specific transactions if they want their block to be accepted into the network by requiring block builders to include all transactions specified by the previous proposer.

Similarly, relays will not transfer censored blocks because the block cannot be included unless it conforms to the inclusion list.



Exploring the Potential Policy and Legal Implications of Inclusion Lists

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The goal of the unconditional inclusion list design is to increase Ethereum's censorship resistance by having block proposers explicitly specify which transactions must be included in the next block. This design can significantly impact the perception of Ethereum's credible neutrality due to the opinionated nature of inclusion lists, potentially leading to unintended effects. On the one hand, the implementation of inclusion lists may reinforce the decentralized and consensus-driven nature of Ethereum infrastructure providers, potentially shielding the base layer from regulatory scrutiny and redirecting attention to the more appropriate application layer. On the other hand, the opinionated nature of inclusion lists could portray Ethereum as less credibly neutral, thereby increasing regulatory scrutiny on infrastructure providers.

Scenario #1: Improve Ethereum's Claim to Credible Neutrality

A core principle of Ethereum is its commitment to being permissionless. Ethereum's permissionless nature is similar to the Transmission Control Protocol/Internet Protocol (TCP/IP) standard, a set of rules that govern the connection of computer systems to the internet. TCP/IP is a protocol that remains fundamentally neutral as to the data it transmits. This neutrality is essential for it to function as a universally accepted and trusted protocol. Similarly, Ethereum intends to function as a decentralized platform where all transactions are treated equally, irrespective of origin or purpose.

Compared to the block-building process today, the unconditional inclusion list design shifts some decision-making power from the block builders to the proposers. This can be seen as positive for the continued decentralization of the Ethereum ecosystem, as the set of proposers is larger and more diverse than the current set of specialized block builders. Additionally, blockchains like Ethereum are based on consensus mechanisms, making it possible for the amalgamation of diverse viewpoints to define credible neutrality. Thus, the shift may be beneficial for Ethereum's claim to credible neutrality as the number of decision-makers increases and grows more diverse.

If the implementation of inclusion lists reinforces the perception of Ethereum as a credibly neutral base layer, it may shield the protocol and its infrastructure providers from additional regulatory scrutiny. Regulators might recognize that targeting the Ethereum base layer or infrastructure providers is ineffective, as these entities are merely facilitating the neutral transmission of data—similar to the role of TCP/IP on the internet.

SHIFTING REGULATION TO APPLICATION DEVELOPERS

Consequently, policymakers and regulators may shift focus to the application layer, which might be seen as a more appropriate place for regulation. In this context, the application layer might consist of any range of frontends, RPCs, sequencers, and any other point in the stack closer to users and developers where risk management can exist. Decentralized applications (dApps) built on top of Ethereum often have centralized points of control, administration, or participation, which could make them more susceptible to regulatory oversight. Regulators could find that requiring dApps to implement risk mitigation is sufficient for consumer protection, removing the need to impose regulations on the base layer.

In August 2022, OFAC sanctioned the Tornado Cash smart contract and added 38 wallet addresses associated with the mixer to the Specially Designated Nationals (SDN) list. Instead of targeting the Ethereum blockchain itself, OFAC also took action against one of the founders, which could be viewed as enforcing censorship at the application level. OFAC's designation of placing an application smart contract on the SDN list was the first of its kind. It demonstrated a shifting focus toward who controls, administers, or plays a centralized role in developing a tech stack.

Though sanctioning the smart contract itself may not be the best way to regulate an application, regulating at the application layer may generally enable a more nuanced and context-specific approach compared to blanket regulations at the protocol level.

By focusing on dApps, regulators may be able to enforce policies that combat illicit actors while still allowing for innovation and the development of legitimate applications. This approach would not be dissimilar to how regulators hold traditional technology companies accountable for the content and interactions facilitated through their platforms, as evidenced by the UK Online Safety Bill passed in September 2023.

In order to boost Ethereum's claim to credible neutrality via inclusion lists, regulators must develop a clear understanding of the distinction between Ethereum's foundational infrastructure and the diverse dApps built on top of the network. While it may be appropriate for regulators to focus on dApps with financial purposes or those acting as intermediaries to determine if they should be subject to regulations, it is equally important to ensure that non-financial dApps are not inappropriately targeted with regulatory requirements.

Scenario #2: Raise a Red Flag to Regulators that Ethereum is not Credibly Neutral

The proposed introduction of inclusion lists into Ethereum's ecosystem can also pose a challenge to the ethos of neutrality. Inclusion lists involve proposers making deliberate choices about which transactions to include in a block—something that is inherently opinionated. Such decisions by proposers could be based on different criteria, including regulatory demands, personal biases, or varying risk tolerance, thereby introducing subjectivity into what is intended to be an impartial system. This choice by proposers can be seen as directly contradicting the principle of credible neutrality, making the system's impartiality dependent on proposers as individual decision-makers.

For policymakers or regulators who are already skeptical of Ethereum's neutrality and do not understand the underlying technology, this change could be another example of how blockchain technology claims neutrality while making opinionated decisions. For example, the fact that a proposer would have the ability to select which addresses to filter or not could cause policymakers to question whether Ethereum is a neutral platform.

Invasive political, economic, or moral questions can emerge from regulators looking to understand a proposer's decision-making for any one of the blocks added to the network. The respective proposer's responses could then be used by regulators or law enforcement to bring enforcement or criminal actions.

In the current U.S. political climate, inclusion lists may bring additional scrutiny to Ethereum, including by policymakers who openly argue that blockchain technology is primarily a tool for illicit activity. By implementing inclusion lists, Ethereum could diverge from the current and appropriate model that is best analogized to TCP/IP, wherein there is already legal precedence in the United States that routers of messages do not have the same regulatory requirements or obligations as financial institutions or intermediaries.

MIGRATION OF PROPOSERS AND BLOCK BUILDERS OUT OF REGULATED MARKETS

The implementation of inclusion lists could also ultimately force proposers and block builders to relocate from regulated markets:

Proposers

Proposers residing in jurisdictions that regulate or want to regulate blockchain infrastructure as if it is equivalent to traditional financial rails may be faced with the following options:

1. Implement inclusion lists in a way that does not contribute to Ethereum's censorship resistance.
2. Move to another jurisdiction where the laws or regulations are more lax (or may not exist).

In the first case, proposers may try to avoid regulatory scrutiny by implementing inclusion lists that filter addresses based on their regional sanctions list. For robust protection, proposers would have to ensure that they are cross-referencing (and deconflicting) sanctions lists in each jurisdiction that could be applicable to them because there is no governing global sanctions list. This, in and of itself, could be very burdensome on the proposer. Alternatively, the proposer could refuse to create an inclusion list at all and leave it up to the block builder to exclude any transactions deemed necessary. Both of these scenarios might protect the proposer from enforcement action, but they would not improve Ethereum's censorship resistance.

In the second case, a proposer who wants to contribute to improving censorship resistance but resides in a jurisdiction that regulates the base layer may decide to move to a different jurisdiction that does not impose such strict requirements. As with anything that limits or decreases the diversity of ecosystem participants, including geography, this could undermine Ethereum's validator decentralization.

Block builders

The regulatory risks are even more acute for block builders. Block builders will have no choice but to follow the enforced inclusion lists to ensure that their blocks are accepted into the network. This lack of autonomy will expose builders to heightened regulatory risks, and they could be held liable for blocks containing transactions from sanctioned addresses. Similar to the proposers discussed above, block builders may be forced to migrate their operations to more permissive jurisdictions to avoid potential legal or regulatory action.

The discretionary power granted to proposers and the lack of autonomy for block builders under this system may expose these entities to heightened scrutiny from regulators and law enforcement agencies, especially in jurisdictions like the United States. As mentioned before, even if proposers or block builders reside in more permissive jurisdictions, they will have to take on the burdensome task of tracking the sanctions requirements across multiple jurisdictions in order to minimize the potential enforcement actions outside of where they reside. This further underscores the unique challenges of imposing unconditional inclusion lists on the proposers and block builders, who are critical to the security of Ethereum and the broader ecosystem.

Further Research

Further Research

Inclusion lists represent the complex challenge of enhancing censorship resistance in the Ethereum ecosystem. However, as discussed, this solution comes with its own set of legal and policy implications that could potentially undermine the very principles it aims to uphold. To guide future research and development efforts, we propose a two-pronged framework that prioritizes credible neutrality and minimizes legal and policy risks.

Defining and Enforcing Credible Neutrality

The first step in developing effective solutions is to establish a clear and widely accepted definition of credible neutrality within the context of blockchain technology. This definition is necessary in order to maintain expectations that must be met for a solution to uphold the credible neutrality of the network. The definition should encompass the core principles of permissionlessness and decentralization that underpin the Ethereum ethos. Some key aspects to consider include:

1. Equal treatment of all transactions, regardless of origin or purpose
2. Minimal reliance on subjective decision-making by individual actors
3. Resistance to external influence or manipulation
4. Transparent and auditable processes for transaction inclusion and validation

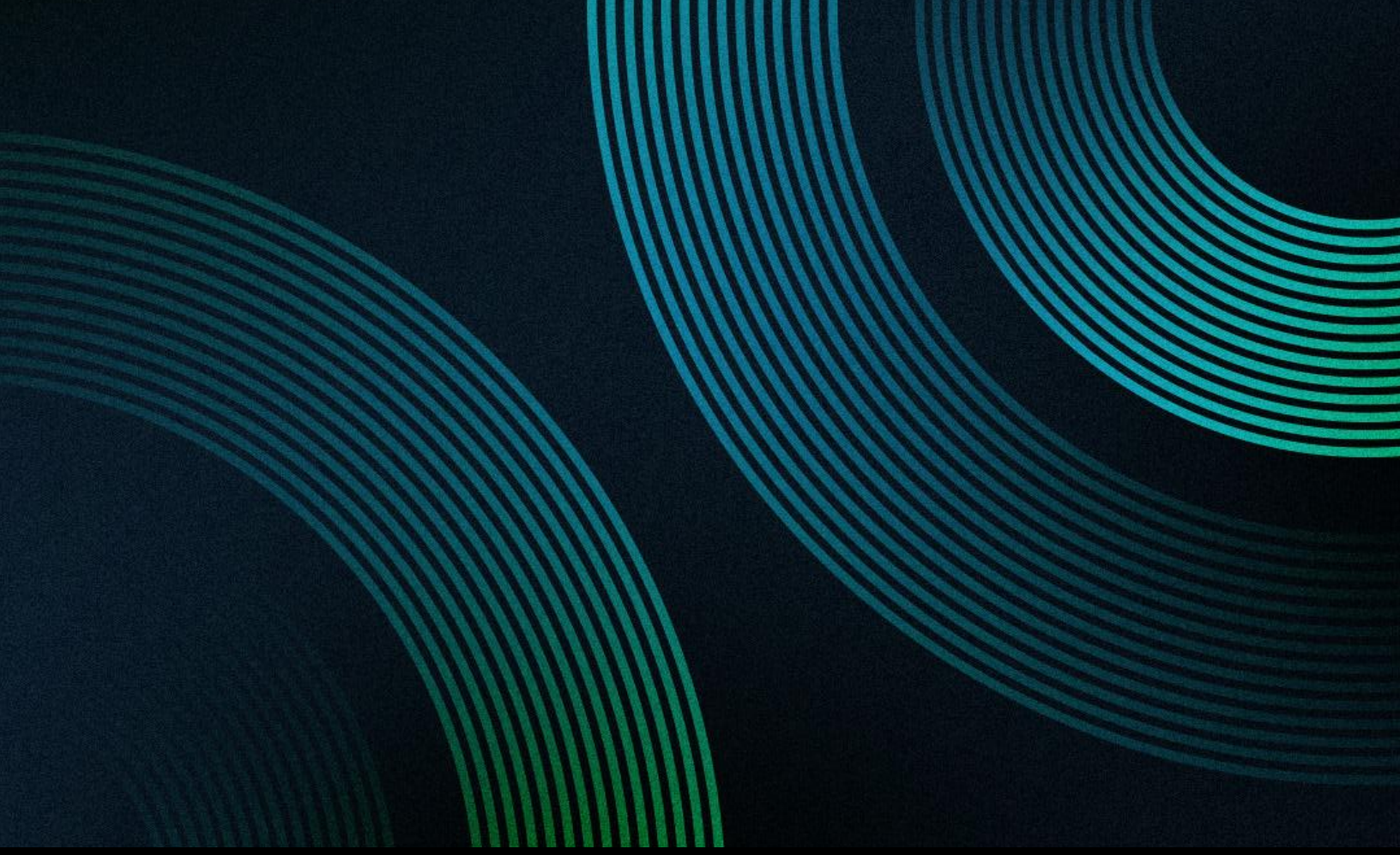
Once a robust definition of credible neutrality is established, researchers can focus on designing solutions that uphold these principles. This may involve exploring alternative incentive structures, architectural modifications, or encryption schemes that inherently enforce neutrality without relying on the discretion of individual participants.

Minimizing Legal and Policy Implications

In addition to technical solutions, it is essential to have continued public-private engagement. Ongoing education from the private sector with policymakers can help demonstrate how cryptography and decentralized ledger technology can actually build better risk management solutions than exist in the traditional tech and financial sectors. Establishing public-private partnerships with subject matter experts that bring together industry experts, academics, and government officials should aim to:

1. Provide clear and accessible explanations of blockchain technology, emphasizing its role as critical infrastructure (and its neutral and decentralized nature).
2. Highlight the potential benefits of blockchain technology beyond financial transactions, including concrete examples of technological innovations (e.g., privacy enhancing technologies, onchain attestation, and identity systems).
3. Develop legislative and regulatory frameworks that clearly distinguish between financial institutions and critical infrastructure, including clarity to distinguish between data transfer, data ordering, messaging, broadcasting, etc. These frameworks must balance consumer protection, security, and innovation.
4. Foster open dialogue and knowledge sharing to ensure that a deep understanding of the technology informs policy decisions. For example, the Bank of International Settlements initiated project Aurora to use privacy-preserving technologies to detect money laundering, and FinCEN launched an initiative to promote privacy-preserving technologies toward the same end.

By proactively engaging with regulators and policymakers, the Ethereum community can help shape the legal and policy landscape in a way that supports the growth and adoption of the technology while mitigating potential risks.



Conclusion

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As the Ethereum network evolves, each technical modification influences regulatory perceptions and responses.

Even though Ethereum exists as an open technology, many of its participants operate in regulated markets. **Inclusion lists, as a result, have significant implications for Ethereum's broader roadmap and usage, especially when building a global financial settlement system.**

Looking forward, **research on censorship resistance will be a balancing act that requires ongoing dialogue amongst developers, network participants, and policymakers.**

This open form of research is what defines Ethereum as a community-run network.

Authors

Authors | PREDICATE

Khushi Wadhwa

Khushi leads Product Research and Strategy at Predicate, a network built to simplify transaction prerequisites. Predicate empowers users, developers, and communities to define rules for onchain interactions.

Previously, Khushi was an Investment Analyst at Geometry, an early-stage venture capital firm focused on applied cryptography technologies.
She has also worked as a Software Engineer and Smart Contract Engineer, and holds a Bachelor's in Computer Science from Carnegie Mellon University.

Nikhil Raghuveera

Nikhil is Co-Founder and CEO of Predicate, a network built to simplify transaction prerequisites. Nikhil is also a Nonresident Senior Fellow at the Atlantic Council's GeoEconomics Center, a leading think tank focused on global economic policy.

Prior to Predicate, Nikhil was Head of Strategy & Innovation at the Celo Foundation. He also worked in management consulting, nonprofit management and economic consulting. Nikhil graduated with an MBA from The Wharton School and an MPA from the Harvard Kennedy School.

Jane Khodarkovsky

Jane is an Advisor to Predicate and Partner at Arktouros, pllc, where she represents projects and builders in the emergent technology space. Prior to joining Arktouros, Jane was General Counsel and Head of Risk & Compliance at Celo Foundation where she oversaw all aspects of legal, regulatory and compliance, focusing on decentralized finance (DeFi), decentralized autonomous organizations (DAOs), anti-money laundering, sanctions, securities, and corporate law in the digital technology space in the United States and abroad.

Jane is also a former federal prosecutor and human trafficking finance specialist with the U.S. Department of Justice. Jane earned her Juris Doctor from the University of Michigan Law School, and Bachelor in Arts from Barnard College, *summa cum laude.*

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