Ethereum Research Task

This document begins by presenting the methodology I used to evaluate ERC-EIPs numbered from #7600 to #7777. It then describes Proposal #7766, which I identify as high-impact and recommend for implementation. Finally, it discusses Proposal #7673, which I argue should not be implemented due to its limited impact.

Methodology

To decide which proposals should be implemented and which should not, I used a two-step methodology:

1. Proposals were quickly ranked from 1 to 5 based on their title and authors. High-scoring proposals are considered potentially valuable and worth implementing, while low-scoring ones appear less important. The scores were determined by answering the following questions:
    a. Does the title include any relevant or trending keywords?
    b. Have the proposal's authors previously made significant contributions to the Ethereum community?
    c. Is the proposal backed or supported by well-known organizations?
2. Three proposals for each sub-task that seemed most interesting were selected for further analysis and then were evaluated based on their importance, urgency, and feasibility.

High-Impact Proposal: EIP #7766

Account Abstraction via ERC-4337 is one of the most significant Ethereum standards in recent years. However, the architecture in ERC-4337 has one big limitation: each transaction must carry its own signature or other form of validation input in order to be included.

Proposal #7766 aims to reduce this limitation by introduces a new entity, aggregator, that is called during validation, to validate multiple user operations at once.

Pro's

The most significant benefit of this proposal is to enable UserOperations to support sharing validation inputs, saving gas and guaranteeing atomicity of the bundle. With over 34 million smart accounts deployed and more than 310 million UserOperations processed, implementing Proposal #7766 would have a highly positive impact on the Ethereum ecosystem.

The proposal's title is compelling, as it references Proposal #4337 and addresses the challenge of signature aggregation, both of which are trending topics in the Ethereum ecosystem.

Additionally, some of the authors are highly respected figures in Ethereum, such as Vitalik Buterin and Yoav Weiss, who have made significant contributions and are leading the development of Account Abstraction.

Moreover, recent achievements in cryptography, smart contracts, and distributed computing make the implementation of this proposal both feasible and timely.

Due to the above reasons, It would be valuable to make this functionality available to users as soon as possible.

Con's

Aggregator contracts are among the most trusted components in the Ethereum ecosystem as they have the power to authorize transactions on behalf of accounts and are able to invalidate large numbers of UserOperations through a single storage update.

Therefore, both account developers and block builders must be very careful when developing or choosing aggregator contracts. The trust assumptions associated with these contracts should be thoroughly assessed, and only well-audited, reputable implementations should be considered. Furthermore, aggregator contracts should be designed and implemented with formal verification in mind to ensure their correctness and security.

Low-Impact Proposal: EIP #7673

This proposal introduces base256emoji as a new format for account addresses, intended to be used as the primary input and display method across all user interfaces.

Pro's

Proposa #7673 clearly highlights the difficulty users face in distinguishing between long strings of hexadecimal characters, which are currently used to represent account addresses. Its approach based on emojis is also interesting.

Con's

It is questionable whether this proposal effectively addresses the intended challenge, due to several concerns:

- Visual similarity: Some emojis appear very similar, making them difficult to distinguish quickly, especially at a glance.

- Accessibility: While emojis are colorful, they may not be suitable for users with color vision deficiencies.
- Memorability: It remains unclear how easily users can remember or verify their account address when represented as a sequence of emojis.
- Author background: There is no well-known evident record of the author's prior experience in usability, accessibility, or related areas, which raises additional concerns about the design's practical viability.

Due to the mentioned reasons, this proposal should not be implemented.