COLLEGE of ENGINEERING AND PHYSICAL SCIENCES

SCHOOL OF COMPUTER SCIENCE

Qualifying Examination

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Improving Fairness in Ethereum Blockchain by Low Fee Transactions Inclusion

Chair: Dr. Joe Sawada
Advisor: Dr. Charlie Obimbo
Advisory: Dr. Xiaodong Lin
Non-Advisory: Dr. Deb Stacey
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Abstract:

Before the implementation of Ethereum Improvement Proposal 1559 (aka EIP1559), gas consumption and its cost in Ethereum smart contracts and Ether cryptocurrency (ETH) transactions had been extremely unpredictable. This unpredictability not only made the executer pay a higher price than was originally intended or scheduled, but also caused the transaction to fail if they chose a lower gas price than needed at that particular moment. This gave an iniquitous advantage to miners over smart contract users, and in essence created a fairness issue in smart contract execution system, where balance was against the user.

Ethereum foundation implemented EIP1559 on August 05, 2021, with the aim to make smart contract's gas fee more predictable so that the imbalance of fairness could be minimized. Based on pre and post EIP1559 on-chain analysis, it is obvious that the predictability has improved but is still not completely predictable to the users, which still raises fairness question that goes against the transaction initiator. This research work studies the EIP1559 benefits over the legacy system then evaluates if ultimate gas-fee iii predictability in Ethereum blockchain has been achieved or not, also, in the latter case, proposes a more inclusive approach by adding time in the transaction selection. We propose a framework within the proof work (PoW) blockchain architecture in which time is included as a third dimension to achieve better fairness in transaction execution. First, we quantify fairness using stipulated outcomes then evaluate its improvement if processed in our proposed framework. We show our preliminary test results and compare the improvement over existing on-chain outcomes.