## 1. Introduction

Elections, a widely recognised and accepted means of selecting leaders require a secure and transparent process. Typically, a third party or a group within the system intervenes to validate and monitor the election’s legitimacy. The report proposes a solution to eliminate third-party interference by introducing a decentralised voting approach, where the public, rather than a designated group, oversees the election’s progress. The implementation of Blockchain technology facilitates this decentralisation by operating a peer-to-peer network of nodes, aiming to eliminate centralized control and intermediaries from the system, establishing a decentralised open ledger system. The blockchain records all votes cast by candidates in a public ledger, ensuring permanence and immutability. Once recorded, votes cannot be altered under any circumstances. Even if an attempt is made to manipulate the ledger, the hacker would need to compromise all previous blocks before adding a new one, an exceedingly challenging task due to the blockchain’s consensus mechanism.

## E-voting System

E-voting is the method of electronically casting and consolidating votes. The votes are recorded in various electronic formats such as tape cartridges, diskettes, and smart cards, which are then transmitted to a centralized location for the compilation process. There are different forms of e-voting, including DER (direct electronic recording) touchscreens and optional scanners. The two primary categories of voting are:

1. On-site e-voting involves the use of electronic voting machines positioned in polling booths, where government officials oversee the voting process. The voters must queue up to cast their vote.
2. Remote e-voting allows individuals to cast their votes from any location, eliminating the need to be physically present at a polling station. This can be done through computers, mobile phones, and other devices via the internet, SMS, or kiosks.

## 2. Development

The suggested system relies on the Ethereum blockchain framework and adopts a permissionless blockchain structure. Ethereum smart contracts are utilized for particular functions and deployed on the blockchain. Due to the decentralized peer-to-peer (P2P) nature of the blockchain, the database is consistently distributed among numerous nodes. Each participant in the blockchain network possesses an identical copy of the database, ensuring essential immutability. Once results are committed, any alteration is impossible without initiating a new transaction.