

# ELECTRONIC VOTING PROJECT

## REQUIREMENTS DOCUMENT

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### Abstract

In this document we define the requirements necessary in developing an Electronic Voting System. We further break down the issue to the four major aspects of the voting system: registration of voters; the voting process itself; the counting of the votes cast; and the transportation and storage of votes. This paper has concerned itself primarily with state or commonwealth voting procedures, which hopefully will be expandable to a national scale.

## 1 Basic Properties

To begin, we defined a basic list of properties that the voting procedure needed to maintain as a whole. They are:

- Private - The election must maintain the anonymity of individual voters.
- Accurate - The election must provide an reliable count of votes cast.
- Convenient - Adding an electronic aspect to the voting process must not add little or no difficulty to the voting process as it exists today. This section will include convenience to the election process in general, not only to the voters involved.
- Fault Tolerant - The election procedure must not fail due to any circumstances.
- Auditable - There must be ways to verify the results of the election after its completion.
- Tamper Proof - The election must be secure so that no outside influences may affect the results.
- Voter Confidence - The process must ensure that the participants have full trust in the system.

Each of these properties was applied to each aspect of the voting process, resulting in the requirements illustrated below. In some cases there were no appropriate requirement resulting from the evaluation of some properties. They are not shown in the appraisal below.

Also, the requirements listed below depict a "perfect world" situation. Some things listed below may not be feasible in an actual implementation. This will be dealt with in future parts of the project.

## 2 Registration of Voters

### 2.1 Private

Registration must not be tied to any particular identification format. Any individual willing to vote must be allowed that right without consideration of what ID papers they possess.

## **2.2 Convenient**

There must be multiple means to request registration. The process cannot force individuals to register in ways that are overly difficult or impossible for them.

There must be a database of registered voters that shall be shared between districts.

## **2.3 Accurate**

We must ensure that registered voters are legally allowed to vote. This includes, but is not limited to, minors, felons, and the dead people. As well, the database must be efficiently constructed so that routine maintenance can be easily performed. For example, a constituent moving from one district to another should not affect the overall number of voters in this database, but only the official polling location of this individual.

## **2.4 Fault Tolerant**

The database of registered citizens must be available at all times.

## **2.5 Voter Confidence**

A receipt of registration, such as a Voter Registration Card, must be provided to all voters. Furthermore, this receipt must be provided in a timely manner so that constituents may be able to inquire about their status should they not receive their confirmation.

# **3 Voting Process**

## **3.1 Private**

Voting must be anonymous. This is a fundamental aspect of the election in general, and must be given a great deal of consideration during implementation.

Also, since this system will be built with electronic input machines, there must be protection against electronic eavesdropping devices.

## **3.2 Accurate**

There must be a thorough testing process applied to all aspects of the implementation. This includes testing everything from the functional operation of the machinery to its logical operation according to a diverse number of individuals.

Individuals must be able to make a write-in vote that is correctly counted.

There will be a paper vote as well as an electronic copy produced by each individual's vote. These two results must match.

## **3.3 Convenient**

A voter must be allowed to enter any voting station and place a vote based on the ballot of his home district.

The ballot must also be presented to voters so that they can easily and accurately express their decisions when voting. This should be accomplished through constructing a simple ballot, as well as giving an example and instructions to voters prior to election day.

Also, the electronic nature of the design should not prohibit any person from voting. This includes modifying aspects of the voting process to allow for people with disabilities or no computer literacy to vote in the same manner as all others.

### **3.4 Fault Tolerant**

There must be backup power devices provided for each station, so a power outage does not drastically disrupt the election.

There should be a redundant array of storage devices at each polling station that can ensure an accurate collection of votes should one device fail.

The devices used to conduct the election should have a modular, pluggable design, and backups of components should be available at each polling location. This also ensures that the failure of a device cannot directly affect the election.

### **3.5 Tamper Proof**

Mechanisms must be provided to guarantee that valid votes are not changed or removed, as well as assuring that invalid votes are not added to the collection.

Foreign county ballots must be cryptographically secured while in transport. This will maintain the reliability of the ballots.

There must be steps taken to ensure that the devices used are not susceptible to electronic interference.

### **3.6 Voter Confidence**

There should be a receipt that is issued to each individual when they complete voting. This should not list the results of their vote, but can be used to verify that their vote was accurately counted.

This receipt should be verifiable by independent third parties should the individual desire to do so. Such political organizations such as the ACLU or NRA may be enlisted to help with this process.

As well, there should be a mechanism through which individuals may verify their vote and that it was recorded correctly.

## **4 Counting of Ballots**

### **4.1 Convenient**

This section is generally unnecessary, as it is our opinion that an increased amount of work for the government is, up to a point, acceptable in order to insure a more reliable election as a whole.

Also, each polling station will conduct its own ballot counting. This will facilitate many aspects of the election process.

### **4.2 Accurate**

The process must ensure that all votes are counted only once, and this count must be correct. Although this may seem like an obvious fact, it is essential to the election process and must be explicitly stated due to its importance.

### **4.3 Auditable and Fault Tolerant**

The redundancy provisions above should be enough to ensure that the counting process should be very auditable and fault tolerant. It is unlikely that an intruder would be able to disrupt the redundant electronic storage of votes as well as the paper fallback option. These options also for several collections of votes, therefore allowing for multiple counts.

As well, there must be a one-to-one correlation between the number of voters and the number of received votes.

## 5 Transportation and Storage of Ballots

Basically, the transportation and storage of ballots must be reliable in all aspects, and must be accurate and private at the same time. However, this aspect of the voting procedure must adhere to current laws regarding elections which are unavailable at this time. Also, there are many aspects of this section that will be somewhat defined by the implementation of the previous requirements, and therefore the transport and storage of ballots is not discussed in detail here.