Chapter 32
A Secure Electronic Voting

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ABSTRACT

This chapter presents a security framework architecture for electronic voting that permits the avoidance of problems occasioned by interposing computer system and technical personnel between the voter and the electoral board. The architecture is based on replicating the conventional security mechanisms and in segregating all critical functions into very simple systems that are audited, monitored and physically secured. This security architecture minimizes the number of components that must be trusted to only two, namely, the software generating the encrypted ballot and the software opening the digital ballot boxes and the envelopes there in. This addresses one of the main causes of trouble in electronic voting systems, namely, the need to trust overly-complex systems like DREs, web browsers, operating systems or Internet servers.

INTRODUCTION

Electronic voting (also known as e-voting) is a term encompassing several different types of voting, embracing both electronic means of casting a vote and electronic means of counting votes.

Electronic voting technology can include punch cards, optical scan voting systems and specialized voting kiosks (including self-contained Direct-recording electronic (DRE) voting systems). It can also involve transmission of ballots and votes via telephones, private computer networks, or the Internet. Electronic voting technology can speed the counting of ballots and can provide improved accessibility for disabled voters. However, there has been contention, that electronic voting especially DRE voting could facilitate electoral fraud. Electronic voting systems for electorates have been in use since the 1960s when punch card systems debuted. The newer optical scan voting systems allow a computer to count a voter's mark on a

ballot. DRE voting machines which collect and tabulate votes in a single machine.

The last fifteen years following the wider trend of ICT adoption in government (e-government) some countries have started slowly adopting and in some cases fully substituting traditional voting systems with electronic voting systems (e-voting).

E-Voting comes in different forms and shapes. A general distinction could be made between electronic machine voting (eMV), which is voting on an election controlled device, and electronic distance voting (eDV), which allows voting remotely using mediums such as the Internet, Short Message Service (SMS), and interactive TV.

Chapter-Based Electronic Voting System

Sometimes called a "document ballot voting system," chapter-based voting systems originated as a system where votes are cast and counted by hand, using paper ballots. With the advent of electronic tabulation came systems where paper cards or sheets could be marked by hand, but counted electronically. These systems included punch card voting, mark sense and later digital pen voting systems.

Most recently, these systems can include an Electronic Ballot Marker (EBM), that allow voters to make their selections using an electronic input device, usually a touch screen system similar to a DRE. Systems including a ballot marking device can incorporate different forms of assistive technology.

Direct-Recording Electronic (DRE) Voting System

A *direct-recording electronic* (DRE) voting machine records votes by means of a ballot display provided with mechanical or electro-optical components that can be activated by the voter (typically buttons or a touch screen).

They were introduced in the 1970s. DREs are somewhat analogous to (although more sophisticated than) lever machines. The voter chooses candidates from a posted ballot. Depending on the equipment used, the ballot may be printed and posted on the DRE, as it is with a lever machine, or it may be displayed on a computer screen. Voters make their choices by pushing buttons, touching the screen, or using other devices. The voter submits the choices made before leaving the booth, for example by pushing a "vote" button, and the votes are then recorded electronically. that processes data by means of a computer program; and that records voting data and ballot images in memory components. After the election it produces a tabulation of the voting data stored in a removable memory component and as printed copy. The system may also provide a means for transmitting individual ballots or vote totals to a central location for consolidating and reporting results from precincts at the central location.

Like all voting machines DRE systems increase the speed of vote counting. They can also incorporate the most broad assistive technologies for the largest classes of handicapped people, allowing them to vote without forfeiting the anonymity of their vote. These machines can use headphones and other adaptive technology to provide the necessary accessibility. DRE's can also provide the most robust form of immediate feedback to the voter detecting such possible problems as undervoting and overvoting which may result in a spoiled ballot. This immediate feedback can be helpful in successfully determining voter intent.

Additionally, with DRE voting systems there is no risk of exhausting the supply of paper ballots, and remove the need for printing of paper ballots, a significant cost. When administering elections in which ballots are offered in multiple languages, DRE voting systems can be programmed to provide ballots in multiple languages on a single machine.

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