

Penetration Testing a US Election Blockchain Prototype^{*}

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Abstract. With electronic voting (e-voting) systems under increased cyber-attack by malicious agents, it is critical that the security of these systems be thoroughly evaluated. This article describes techniques used to comprehensively analyze a prototype mobile voting system utilizing blockchain technology. For identified vulnerabilities, an attack method is described in order to exploit these issues and suggestions are made in order to help resolve the security implications of the attack. This analysis considers multiple layers of the network stack, including the voting application suite of software, as attack vectors. From this, the lessons learned can be used to improve future electronic voting systems by identifying the various attack surfaces regardless if they were successfully exploited or not. This in itself will help add to specific domain knowledge of attacking e-voting systems to utilize blockchain technology.

Keywords: electronic voting · blockchain voting · penetration testing

1 Introduction

Due to recent revelations about electronic voting system attacks by Russia [6] and, ironically, in light of Russia's own blockchain voting system vulnerabilities [3], there is an urgent need to understand the security posture of existing and future voting systems. This paper examines a US election system prototype that utilizes blockchain technology. A future voting system may or may not be based on this prototype, but by thoroughly testing the security posture of such a system we will have a better understanding of the risks exposed or secured by this design. Democratic societies depend upon the integrity of free and fair elections. Cyber-attacks on voting systems undermine confidence in electoral results and present a serious concern to representative democracies.

1.1 Background

A US government organization, that has requested to remain unnamed, plays an important role in national elections. In order to improve voter experience and

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