


Chapter 10

Robust and Secure Evidence Management in Digital Forensics Investigations Using Blockchain Technology

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ABSTRACT

The chapter proposes a framework for evidence management in digital forensic investigations that leverages blockchain technology to ensure integrity and authenticity of the chain of custody process. The framework utilizes smart contracts, nodes, and consensus algorithms to create a tamper-proof record of the entire chain of custody process from evidence collection to presentation. A contract that facilitates transfer of ownership of the forensic report from the forensic laboratory to the

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investigation department is implemented. Using this approach, the authors ensure integrity and security of the forensic report, thereby mitigating any potential risks of tampering or compromise through unethical means. A robust framework to safeguard credibility of forensic report to maintain the chain of custody, instilling confidence in the reliability of the investigative process is established. Traditional methods of evidence management, showing that the proposed framework offers a secure, reliable, and transparent solution for managing digital evidence in digital forensics investigations has been proved.

INTRODUCTION

This paper is specifically directed towards individuals engaged in the field of forensic studies, with a particular emphasis on digital forensic analysts. Additionally, it extends its relevance to cybersecurity professionals actively involved in forensic investigations. Given the expanding footprint of blockchain technology within the healthcare sector, this research work serves as a pivotal stepping stone towards the integration of blockchain solutions into the realm of digital forensics. By addressing the synergies and potential applications of blockchain in this context, this paper paves the way for the establishment of a robust foundation for the utilization of blockchain technology in the enhancement of digital forensic practices.

In recent times, there is a growing trend towards the digitalization of forensic reports[5], mirroring the progression observed in the digitalization of Health Records, commonly known as Electronic Health Records (EHR) or Electronic Medical Reports (EMR). Forensic reports hold critical information pertaining to crime scenes, evidence collection, laboratory analysis, and expert opinions. The utilization of digital evidence plays a pivotal role in digital forensics investigations. However, conventional methods of evidence management have exhibited vulnerabilities to human errors, tampering, and fraudulent activities, consequently posing challenges on reliability and integrity of the evidence.

To overcome these challenges, blockchain technology has emerged as a promising solution for the management of digital evidence. It offers a distributed ledger system that can establish a tamper-proof and decentralized platform for the storage and management of data[1].

Blockchain technology initially emerged as a distributed database solution to keep a decentralized log of transactions performed. The primary idea behind securing the transaction log is to distribute the data among different nodes connected in a chain where changing or modifying each node unethically requires computational power[3]. The reason for the high security and integrity of blockchain is because of various methods such as 'proof of work'. Modifying data unethically requires

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