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Necessity of Fourth Factor Authentication with Multiple Variations as Enhanced User Authentication Technique



K. Sharmila and V. Janaki

Abstract Authentication plays a vital role in granting access to a user by any computing system. There are several existing authentication techniques used for different scenarios which include one-factor, two-factor, and three-factor authentication, where the user submits required credentials and gains access to the system. When a legitimate user is unable to provide his credentials at any point of time, the user becomes unauthenticated. At this juncture, we have proposed a fourth factor for authentication where a legitimate user can seek assistance from any of his close associates like a spouse, friend, and colleague and can gain access to the system for a single time. In this paper, we consider multiple variations of fourth-factor authentication and compare them within the framework and explore the mechanism by applying various metrics such as key size, the ease of use, time and space complexity of the algorithms, and security considerations.

Keywords Authentication · Fourth factor · Diffie-Hellman key exchange · AES algorithm · Chinese remainder theorem

1 Introduction

Designing any authentication technique requires the integration of various aspects of computer science and other associated sciences. Depending on the type of technique chosen, it requires design and analysis of protocol, security features, cryptographic calculations, device dependency, etc. The main motivation of any authentication scheme is to ensure that the identification of the user is proved to the computer and access is granted to the user for further transactions. The authentication techniques are mainly available in three categories [1–3].

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