Secure NFC Communication in Mobile Payments: Evaluating Privacy and Authentication in Tap-to-Pay Systems

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***Abstract*—This paper examines the security of Near Field Communication (NFC) technology in mobile payment systems, with a focus on tap-to-pay transactions across different device platforms. It describes how NFC operates within mobile payments and identifies key vulnerabilities that can arise during real-world use, such as relay attacks, token theft, backend compromise, and biometric spoofing. The work also reviews and compares existing authentication mechanisms and security frameworks, assessing their effectiveness in mitigating these risks. Through the lens of a practical case study, the analysis connects technical concepts to realistic threat scenarios, highlighting recurring security challenges, platform-specific differences, and areas where improvements are still needed. The purpose is to provide a clear, evidence-based understanding of how NFC security measures function in practice and how they address or fail to address the most pressing privacy and authentication concerns in current mobile payment deployments.**

***Keyword*—Near Field Communication, Mobile Payments, Authentication, Privacy, Security Frameworks**

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