Abstract

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Mobile Transactions Employing Embedded Smartphone Flashlight to Replace ATM Cards

Over the last decade, automatic teller machines (ATMs), electronic banking transactions, smart and mobile payments were introduced and rapidly became essential for business activities. Nowadays, bank account owners rely on such methods for managing their everyday finances. On the other hand, the dependence on smartphones has rapidly increased within the past few years to become a vital hybrid personal assistant by executing several of other functions beside phone calls and texting. Smartphones have replaced many electronic devices and for that reason, it is of great interest to use such phones to replace magnetic cards. This study experimentally transmits the required information on the magnetic card using mobile smartphones to the ATM card readers over a visible light communication channel at high data rates. This research encodes the camera flashlight embedded in almost every smartphone with the required information with no additional hardware on the receiver end. However, a small sized non-expensive module is added to ATMs and card readers to detect and decode the received data. In this study, data has been transmitted using both currently available smartphone flashlight types namely, Xenon and light emitting diode (LED). Adapted modulation techniques were used for both flashlights in order to maximise synchronization and therefore optimize transmission. Error-free transmission has been achieved employing the proposed unidirectional light shielded optical link with speeds up to 15 bps and 500 bps for Xenon and LED flashlights respectively. The performance of the proposed system is measured under the effect of a noisy channel and at different distances between the transmitter and receiver. The executed experiments have showed the importance of using a light shield more significantly in the case of the low brightness LED flashlight. Its error-free transmission speed is ped 80% under the effect of noise. On the other hand, the distance between the transmitter and the receiver has proven another factor that directly affects the transmission speed and the bit error rate. As a result, a shielded short distance channel is required to optimize the performance of the proposed system.