Data immunity in near field radio frequency communication systems – NFC as an aspect of electromagnetic information security

Tytuł
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Typ publikacji
Artykuł

Rok
2024

Data dokładna

Autorzy słownie

Autorzy
Firlej Andrzej Kubiak Ireneusz Musiał Sławomir

ISBN/ISSN

Informacje dodatkowe
Applied Sciences, 14(13), 5854.2024,

Submission received: 31 May 2024 / Revised: 20 June 2024 / Accepted: 25 June 2024 / Published: 4 July 2024

Abstract:

The NFC and MIFARE systems (referred to as HF-band RFID) are a special case of Radio Frequency Identification (RFID) technology using a radio frequency of 13.56 MHz for communication. The declared range of such communication is usually several cm and is characterized by the need to bring the data carrier close to the system reader. Due to the possibility of transmitting sensitive data in this type of system, an important problem seems to be the electromagnetic security of the transmitted data between the cards (tags) and the reader and within the system. In most of the available research studies, the security of RFID systems comes down to the analysis of the effectiveness of encryption of transmitted data or testing the range of communication between the reader and the identifier. In this research, however, special attention is paid to the so-called electromagnetic information security without the analysis of cryptographic protection. In some cases (e.g., data retransmission), encryption may not be an effective method of securing data (because, e.g., encrypted data might be used to open and start a car with a keyless system). In addition, the research draws attention to the fact that the data from the identifier can be accessed not only from the identifier, but also from the control system (reader, wiring, controller, etc.) from which the data can be radiated (unintentionally) at a much greater distance than the communication range between the identifier and the reader. In order to determine the security of the transmitted data in the HF-band RFID systems, a number of tests were carried out with the use of specialized equipment. During the measurements, both the data carriers themselves (cards, key fobs, stickers, tags) and exemplary systems for reading data from the media (a writable card reader, a mobile phone with NFC function, and an extensive access control system) were tested. The experiments carried out made it possible to determine the safety of NFC and MIFARE systems during their use and only storage (e.g., the ability to read data from an identification card stored in a pocket).

Keywords:
electromagnetic compatibility; electromagnetic disturbances; device immunity; measurement techniques; protection of information; NFC; RFID

Powiązane publikacje

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Adres url strony

https://doi.org/10.3390/app14135854