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Part 2: Test and evaluation methods

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Partie 2: Méthodes d'essai et d'évaluation

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Foreword

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A list of all parts in the ISO/IEC 20897 series can be found on the ISO website.

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Introduction

This document specifies the test methods for physically unclonable functions (PUFs) for generating non-stored cryptographic parameters.

Cryptographic modules generate the certain class of critical security parameters such as a secret key using a random bit generator within the modules. Such modules may store generated security parameters in embedded non-volatile memory elements. For a higher security, a combination of tamper response and zeroisation techniques may be used for protecting stored security parameters from active unauthorized attempts of accessing such parameters. As the reverse-engineering technology advances, however, the risk of theft of such stored security parameters has become higher than ever.

The rapidly pervading technology called a PUFs is promising to mitigate the above-mentioned risks by enabling security parameter management without storing such parameters. PUFs are hardware-based functions providing mathematical unclonability, steadiness and randomness of their outputs and physical unclonability of the functions themselves, taking advantage of intrinsic subtle variations in the device's physical properties, which are also considered objects' fingerprints. PUFs may be used for security parameter (e.g. key, initialization vector, nonce and seeds) generation, entity authentication or device identification in cryptographic modules. More detailed information about the characteristics and security requirements of the PUF are given in ISO/IEC 20897-1 and this document only describes test and evaluation methods.

Now, security requirements of PUFs should be considered at system level, meaning that they should consider many possible attack paths, as detailed further in this document. The purpose of this document is to specify how to test those security requirements for assuring an adequate level of quality of the provided PUFs in cryptographic modules. This document is supposed to be used for the following purposes:

a) In the procurement process of a PUF-equipped product, the procurement body specifies the security requirements of the PUF in accordance with ISO/IEC 20897-1. The product vendor evaluates the PUF in accordance with this document whether the PUF satisfies all the specified security requirements, and reports the evaluation results to the procurement body.

b) The vendors evaluate the security of their PUF in accordance with this document, publicize the evaluation results and clarify the security of their PUF.

It should be noted that all of the security requirements defined in ISO/IEC 20897-1 are not necessarily quantitatively evaluable.