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2009 Annual Update**

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# **The eSTREAM Portfolio**

## **2009 Annual Update**

### **Editors**

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# Chapter 1

## The eSTREAM Portfolio – 2009 Annual Update

### 1.1 Introduction

eSTREAM, a multi-year project co-ordinated by ECRYPT, came to an end in 2008. The eSTREAM project finished with the publication of a portfolio of promising new stream ciphers that might be suited to fast encryption in software (Profile 1) or efficient encryption—in terms of physical resources—in hardware (Profile 2). The final portfolio, published in April 2008, contained eight algorithms [5]. The portfolio was revised in September 2008 [6] after the announcement of cryptanalytic results against one of the algorithms [16]. The current eSTREAM portfolio contains the following seven algorithms (in alphabetical order).

<i>Profile 1</i>	<i>Profile 2</i>
HC-128	Grain v1
Rabbit	MICKEY v2
Salsa20/12	Trivium
Sosemanuk	

When the portfolio was published [5, 6], it was the opinion of the eSTREAM committee that all the algorithms in the portfolio were relatively immature. And even though confidence in the portfolio ciphers will increase over time, this still remains the considered position of experts in the field. With this in mind, the portfolio is periodically revisited with an eye to any new results in the literature.

In this report we highlight some cryptanalytic results that have helped increase our understanding of the portfolio ciphers, along with results that might signal structural features impacting their practical use and deployment. We also mention new results on the hardware and/or software implementation of portfolio ciphers that may be of interest to developers seeking to implement the stream ciphers. However, even after a year of additional research, the eSTREAM portfolio remains unchanged. So while the portfolio algorithms will certainly benefit from more analysis over coming years, at the moment their design still appears to

be sound. eSTREAM continues to be maintained and any changes to the portfolio will be announced on <http://www.ecrypt.eu.org/stream/>.

## 1.2 Cryptanalytic Results

It is gratifying that analysis of the portfolio algorithms has continued beyond the publication of the portfolio and the end of the eSTREAM project. As well as a brief survey of the literature we have consulted the algorithm designers and there appear to be no new results that question the security claims of the portfolio ciphers.

For instance, there are a few publications analysing features of the Salsa20 family of stream ciphers [2, 17, 22], but these do not seem to affect the security of the Salsa20/12 algorithm [8] itself. Likewise, recent analysis of HC-128 [21], Rabbit [20], and Sosemanuk [19] do not affect the practical security of these ciphers.

For the hardware-oriented ciphers (Profile 2), while some articles have discussed generic stream cipher properties and used MICKEY as the focus of their analysis [1, 23], there appear to be no new security results on MICKEY v2. The initialisation of both Trivium and Grain v1 continues to interest cryptanalysts [24, 10, 3, 4, 12] and while notable progress has been made in the analysis of this component, the status of these algorithms remains unchanged from last year.

## 1.3 Implementation Results

The best references for implementation profile of eSTREAM algorithms in hardware are [11, 13, 14, 18, 15], some of which appeared before the publication of the eSTREAM portfolio. The software performance of the eSTREAM ciphers was presented in [9] with further extensive results being available at [7].

## 1.4 Other Developments

There have been some other developments with the portfolio ciphers that may be of interest to the community. Rabbit has been released into the public domain and the designers confirm that it can be used freely for any purpose. We also note that CyaSSL [25], an open source embedded implementation of the SSL/TLS protocol, includes both HC-128 and Rabbit in their latest release version.



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