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Information technology — Security techniques — Encryption algorithms —

Part 4: Stream ciphers

AMENDMENT 1: ZUC

Technologies de l'information — Techniques de sécurité — Algorithmes de chiffrement —

Partie 4: Chiffrements en flot

AMENDEMENT 1: ZUC

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Information technology — Security techniques — Encryption algorithms —

Part 4: Stream ciphers

AMENDMENT 1: ZUC

Introduction

Change the last paragraph as follows:

This document includes six dedicated keystream generators:

— MUGI keystream generator;

— SNOW 2.0 keystream generator;

— Rabbit keystream generator;

— Decim^{v2} keystream generator;

— KCipher-2 (K2) keystream generator; and

— ZUC keystream generator.

4.1

Add the following symbols:

L_1 Linear transform with index 1 used for ZUC.

L_2 Linear transform with index 2 used for ZUC.

SS Subfunction used for ZUC.

*SUB*1 Lookup table with index 1 used for ZUC.

*SUB*2 Lookup table with index 2 used for ZUC.

8.6

Add new subclause 8.6 as follows:

8.6 ZUC keystream generator

8.6.1 Introduction to ZUC

ZUC is a keystream generator which uses as input a 128-bit secret key K and a 128-bit initialization vector IV. These are used to initialize state variables S_i ($i \geq 0$). The bit/byte order is big-endian, i.e., if the key and initialization vector are given as a sequence of bits/bytes, the first/leftmost bit/byte is the

most significant bit/byte of the corresponding data. It outputs a 32-bit keystream Z_i at every iteration of the function *Strm*.

The state variable S_i consists of two components. The first consists of sixteen 31-bit variables:

$$A^{(i)} = (A_{15}{}^{(i)}, A_{14}{}^{(i)}, \ldots., A_0{}^{(i)}),$$

and maintains the state of a linear feedback shift register. The second consists of two 32-bit variables:

$$R^{(i)} = (R_2{}^{(i)}, R_1{}^{(i)}),$$

that maintains the state of a finite state machine. ZUC is summarised in Figure 15, which shows a snapshot if its operation, at time *i*, omitting the time-dependent variable (*i*) from the notation.

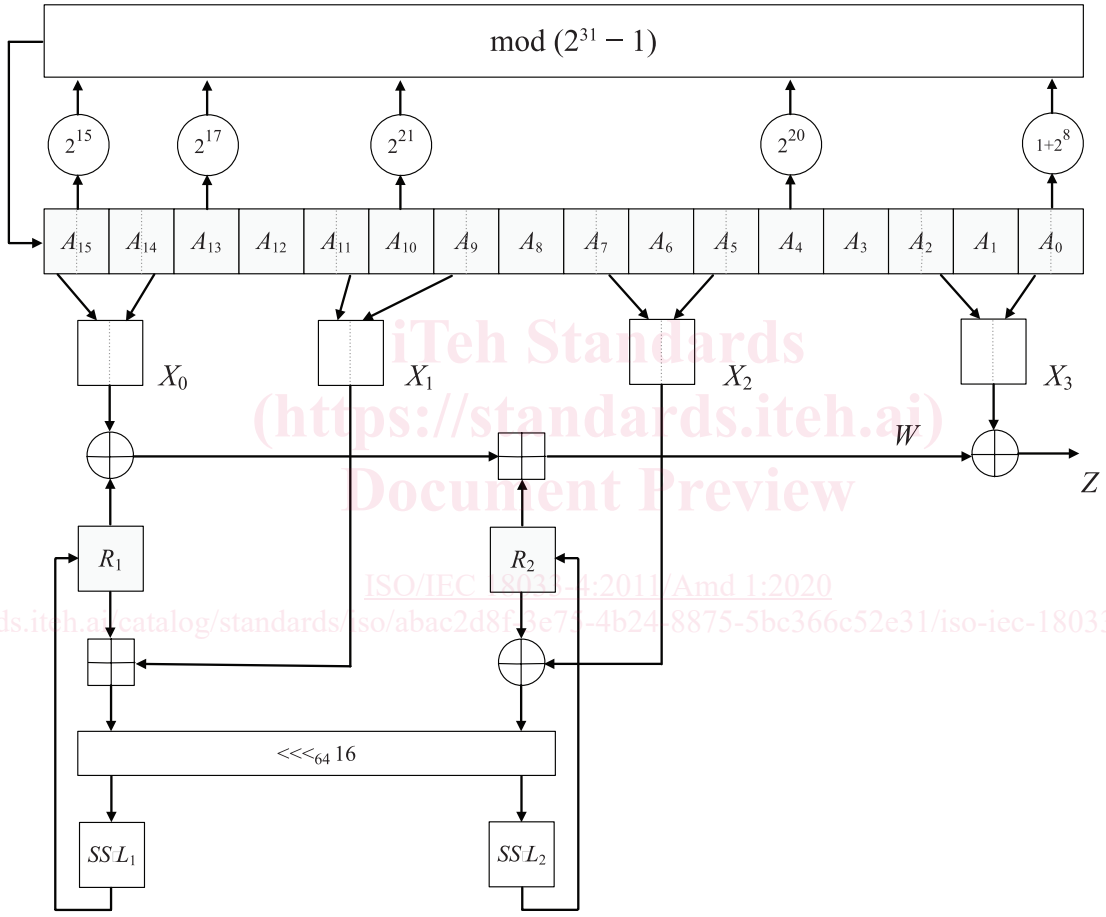

Figure 15 — Schematic drawing of ZUC

The *Init* function, defined in detail in 8.6.2, takes as input the 128-bit key *K* and the 128-bit initialization vector *IV*, and produces the initial value of the state variable $S_0 = (A^{(0)}, R^{(0)})$.

The *Next* function, defined in detail in 8.6.3, takes as input the state variable $S_i = (A^{(i)}, R^{(i)})$ and produces as output the next value of the state variable $S_{i+1} = (A^{(i+1)}, R^{(i+1)})$. The *Next* function runs in two modes, depending on whether the iteration performed is part of the initialization mode or of the normal mode of generating output.

The *Strm* function, defined in detail in 8.6.4, takes as input the state variable $S_i = (A^{(i)}, R^{(i)})$ and produces as output the 32-bit keystream Z_i.

NOTE See document [20] for theoretical background on the design rationale for ZUC.

