International Olympiad in Cryptography NSUCRYPTO'2021Second roundOctober 18-25General, Teams

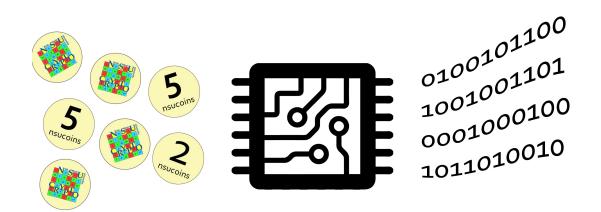


Problem 9. «2021-bit key»

A pseudo-random generator produces sequences of bits (that is of 0 and 1) step by step. To start the generator, one needs to pay 1 *nsucoin* and the generator produces a random bit (that is a sequence of length 1). Then, given a generated sequence S of length $\ell, \ell \ge 1$, one of the following operations can be applied on each step:

- 1. A random sequence of 4 bits is added to S, so a new sequence S' has length $\ell + 4$. The charge for using this operation is 2 nsucoins.
- **2.** A random sequence of 2ℓ bits is added to S, so a new sequence S' has length 3ℓ . The charge for using this operation is 5 *nsucoins*.

Bob needs to generate a secret key of length exactly 2021 bits for his new cipher. What is the minimal number of *nsucoins* that he has to pay for the key?





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