1 Diffie-Hellman and El Gamal

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Abstract

Introduction

Here comes the intro....

1.1 Diffie-Helmann Security

1.1.1 Computational-Diffie-Hellman-Problem

The Computational-Diffie-Hellman-Problem relies on the mathmatical discrete logarithm problem, which is used in more than one encryption procotoll.

Definition 1. Let G a finite cyclic group of the order p. If p is a prime number and g a primitive root mod p then for every $A \in \{1, 2, ..., p-1\}$ there is exactly one exponent $a \in \{0, 1, 2, ..., p-2\}$ with $A \equiv g^a \mod n$ [1][2].

Which menas „the exponent a is called *discrete logarithm* of A to the basis of g “[1]. Currently there is no suitable algorithm for an efficient calculation for this mathmatical problem known. The cumulative distribution function of the discrete logarithm appears to be very random for a big prime group. This leads to the fact, that the discrete logarithm can not calculated in a sufficient time for attackers.

When an attacker gets the numbers p, g, A and B he does not know the discrete logarithm. He has to calculate the secret key. So in fact the Computational-Diffie-Hellman-Problem is to calculate the secret key $K = g^{ab} \mod p$ [1][2][3].

1.1.2 Decisional-Diffie-Hellman-Problem

1.1.3 Primenumber p and Bitlength q

1.1.4 Man in the middle attack

1.2 El Gamal problems

1.2.1 Protocol problems

1.2.2 Subgroup problems

Literatur

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