

RSA and El-Gamal Cryptosystems

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Abstract—We present our analysis of RSA and ElGamal cryptosystem with great detail. We show that there are some attacks on RSA. The mathematical foundation of ElGamal cryptosystem, namely discrete logarithm problem is discussed. Basic structure of our implementation codes is also mentioned.

Keywords—RSA, El-Gamal, implementation, public key, cryptosystem

1 INTRODUCTION

PUBLIC key cryptosystem.
The rest

2 PUBLIC KEY CRYPTOSYSTEM

2.1 More Details

Some problems with this template...I mean, the subsubsection part.

3 RSA CRYPTOSYSTEM

This is just another testing case.

4 EL-GAMAL CRYPTOSYSTEM

As stated in the Section 1, after the introduction of public key cryptosystems concept by Diffie and Hellman in [1], a lot of trials and errors have been made to find feasible cryptosystems. The security of RSA system discussed above has much to do with large integers factorization. The knapsack public key encryption scheme relies on the complexity of subset sum problem, which is NP-complete [2]. The first example of *provably secure* public key encryption scheme, i.e. the Rabin scheme, is based on the problem of finding square roots of a modulo a prime. In a more generic manner, the Rabin encryption scheme is derived from the problem of finding d^{th} roots in a finite field, which is

intensively discussed in [3]. In this section, we discuss another cryptosystem that is still being widely used, i.e. ElGamal cryptosystem.

It is well recognized that the ElGamal cryptosystem could be regarded as Diffie-Hellman key agreement [4] in key transfer mode. Thus, the security of ElGamal cryptosystem has much to do with the intractability of discrete logarithm problem as well as the Diffie-Hellman problem. We analyze them one by one thereafter. We follow the definition style in [5].

4.1 Diffie-Hellman Problem

The Diffie-Hellman key exchange agreement and its derivatives, alongside with ElGamal public key encryption scheme are formed on the basis of Diffie-Hellman problem.

Definition The Diffie-Hellman problem (DHP): find $\alpha^{ab} \bmod p$, provided that a prime p , a generator α of Z_p^* , and elements $\alpha^a \bmod p$ and $\alpha^b \bmod p$

Definition The generalized Diffie-Hellman problem (GDHP):

4.2 Basic El-Gamal Encryption

Well, I really want to finish those stuff as soon as possible. In this way I have to abort something else.

4.3 Generalized El-Gamal Encryption

Life is so damn hard. Isn't it? Just another

4.4 El-Gamal in Digital Signature

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4.5 Some Possible Attacks

5 IMPLEMENTATION

Implementation process will be discussed here. Let the hunt begin [4].

5.1 RSA

5.2 El-Gamal

6 CONCLUSION

Conclusion and Contributions.

APPENDIX A

PROOF OF THE FIRST ZONKLAR EQUATION

Appendix one text goes here.

APPENDIX B

SOME RELATED MATH STUFF WILL BE DISPLAYED HERE

Appendix two text goes here.

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