Cryptology ePrint Archive: Report 2011/392

An Efficient Rational Secret Sharing Scheme Based on the Chinese Remainder Theorem (Revised Version)

Yun Zhang, Christophe Tartary and Huaxiong Wang

Abstract: The design of rational cryptographic protocols is a recently created research area at the intersection of cryptography and game theory. At TCC'10, Fuchsbauer \emph{et al.} introduced two equilibrium notions (computational version of strict Nash equilibrium and stability with respect to trembles) offering a computational relaxation of traditional game theory equilibria. Using trapdoor permutations, they constructed a rational t-out-of s-sharing technique satisfying these new security models. Their construction only requires standard communication networks but the share bitsize is 2 n |s| + O(k) for security against a single deviation and raises to (n-t+1)\cdot (2n|s|+O(k)) to achieve (t-1)-resilience where k is a security parameter. In this paper, we propose a new protocol for rational t-out-of s-sharing scheme based on the Chinese reminder theorem. Under some computational assumptions related to the discrete logarithm problem and RSA, this construction leads to a (t-1)-resilient computational strict Nash equilibrium that is stable with respect to trembles with share bitsize SO(k). Our protocol does not rely on simultaneous channel. Instead, it only requires synchronous broadcast channel and synchronous pairwise private channels.

Category / Keywords: cryptographic protocols / rational cryptography, computational strict Nash equilibrium, stability with respect to trembles, Asmuth-Bloom sharing

Publication Info: the original version has been published by ACISP 2011 and here we make some modifications

Date: received 19 Jul 2011

Contact author: zhan0233 at e ntu edu sg

Available formats: PDF | BibTeX Citation

Version: 20110720:204050 (All versions of this report)

Discussion forum: Show discussion | Start new discussion

[Cryptology ePrint archive]