MPC for Group Reconstruction Circuits

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June 7, 2022

Abstract

In this paper, we present a thing.

1 Introduction

Write the introduction

2 Background

Throughout this paper, we let $\mathbb{G}$ denote a group of prime order q, with generators G and H. Let $\mathbb{F}_q$ denote the scalar field associated with this group, and let $\mathbb{Z}/(q)$ denote the additive group of elements in this field.

We make heavy use of group homomorphisms throughout this paper. We let

$$\varphi(P_1, \ldots, P_m) : \mathbb{A} \to \mathbb{B}$$

denote a homomorphism from $\mathbb{A}$ to $\mathbb{B}$, parameterized by some public values $P_1, \ldots, P_m$. Commonly $\mathbb{A}$ will be a product of several groups $\mathbb{G}_1, \ldots, \mathbb{G}_n$, in which case we'd write:

$$\varphi(P_1, \ldots, P_m)(x_1, \ldots, x_n)$$

to denote the application of φ to an element $(x_1, \ldots, x_n)$ of the product group. We also often leave the public values P_i implicit.

2.1 Pedersen Commitments

2.2 Sigma Protocols

2.3 Maurer's φ-Proof

In [Mau09], Maurer generalized Schnorr's sigma protocol for knowledge of the discrete logarithm cite to a much larger class of relations. In particular, Maurer provided a sigma protocol for proving knowledge of the pre-image of a group homomorphism φ. We denote this protocol as a "φ-proof", and recapitulate the scheme here.

References

[Mau09] Ueli Maurer. Unifying Zero-Knowledge Proofs of Knowledge. In *AFRICACRYPT 2009*, volume 5580 of *LNCS*, pages 272–286. Springer, Berlin, Heidelberg, 2009.