

## Accepted Manuscript

Bitcoin-based fair payments for outsourcing computations of fog devices

Hui Huang, Xiaofeng Chen, Qianhong Wu, Xinyi Huang, Jian Shen

PII: S0167-739X(16)30757-9

DOI: <http://dx.doi.org/10.1016/j.future.2016.12.016>

Reference: FUTURE 3257

To appear in: *Future Generation Computer Systems*

Received date: 9 June 2016

Revised date: 15 November 2016

Accepted date: 11 December 2016

Please cite this article as: H. Huang, X. Chen, Q. Wu, X. Huang, J. Shen, Bitcoin-based fair payments for outsourcing computations of fog devices, *Future Generation Computer Systems* (2016), <http://dx.doi.org/10.1016/j.future.2016.12.016>

This is a PDF file of an unedited manuscript that has been accepted for publication. As a service to our customers we are providing this early version of the manuscript. The manuscript will undergo copyediting, typesetting, and review of the resulting proof before it is published in its final form. Please note that during the production process errors may be discovered which could affect the content, and all legal disclaimers that apply to the journal pertain.



## Bitcoin-based Fair Payments for Outsourcing Computations of Fog Devices

Hui Huang<sup>a</sup>, Xiaofeng Chen<sup>a,b,\*</sup>, Qianhong Wu<sup>c</sup>, Xinyi Huang<sup>d</sup>, Jian Shen<sup>e</sup>

<sup>a</sup>State Key Laboratory of Integrated Service Networks, Xidian University, Xi'an, China

<sup>b</sup>Guangxi Cooperative Innovation Center of cloud computing and Big Data, Guilin University of Electronic Technology, Guilin, China

<sup>c</sup>School of Electronic Information Engineering, Beihang University, Beijing, China

<sup>d</sup>Fujian Provincial Key Laboratory of Network Security and Cryptology, Fujian Normal University, Fuzhou, China

<sup>e</sup>School of Computer and Software, Nanjing University of Information Science & Technology (NUIST), Nanjing, China

---

### Abstract

Fog computing can be viewed as an extension of cloud computing that enables transactions and resources at the edge of the network. In the paradigms of fog computing, the fog user (outsourcer) with resource-constraint devices can outsource the distributed computation tasks to the untrusted fog nodes (workers) and pays for them. Recently, plenty of research work has been done on fair payments. However, all existing solutions adopt the traditional e-cash system to generate payment token, which needs a trusted authority (i.e. a bank) to prevent double-spending. The bank will become the bottleneck of the payments system. In this paper, we propose a new fair payment scheme for outsourcing computations based on Bitcoin. Due to the advantages of Bitcoin syntax, the users can transact directly without needing a bank. Besides, the proposed construction can guarantee that no matter how a malicious outsourcer behaves, the honest workers will be paid if he completed the computing tasks.

*Keywords:* Fog computing, Outsourcing computations, Bitcoin contract, Commitment-based sampling

---

### 1. Introduction

Fog computing, also called edge computing, enables computing and storage to be realized at the edge of the network. Its prominent advantage is providing new applications and services for various users [1]. Vaquero et al. [2] have defined fog computing as that the storage and processing tasks can be performed

---

\*Corresponding author

*Email addresses:* hhui323@163.com (Hui Huang), xfchen@xidian.edu.cn (Xiaofeng Chen), qianhong.wu@buaa.edu.cn (Qianhong Wu), xyhuang81@yahoo.com (Xinyi Huang), s\_shenjian@126.com (Jian Shen)

متن کامل مقاله

دریافت فوری ←

**ISI**Articles

مرجع مقالات تخصصی ایران

- ✓ امکان دانلود نسخه تمام متن مقالات انگلیسی
- ✓ امکان دانلود نسخه ترجمه شده مقالات
- ✓ پذیرش سفارش ترجمه تخصصی
- ✓ امکان جستجو در آرشیو جامعی از صدها موضوع و هزاران مقاله
- ✓ امکان دانلود رایگان ۲ صفحه اول هر مقاله
- ✓ امکان پرداخت اینترنتی با کلیه کارت های عضو شتاب
- ✓ دانلود فوری مقاله پس از پرداخت آنلاین
- ✓ پشتیبانی کامل خرید با بهره مندی از سیستم هوشمند رهگیری سفارشات