

SECURE PUB-SUB: BLOCKCHAIN-BASED FAIR PAYMENT WITH REPUTATION FOR RELIABLE CYBER PHYSICAL SYSTEMS

Abstract: The cyber physical system (CPS) has gained considerable success in large-scale distributed integration environment. In such systems, the sensor devices collect data which would be disseminated via reliable manner to all interested co-operant entities from the physical world. However, highly unreliable environment of CPS, for example, a number of limitations of existing network middle wares, makes secure and reliable data distribution services a challenge issue. In this paper, we propose a new architecture called secure pub-sub (SPS) without middle ware, i.e., blockchain-based fair payment with reputation. In SPS, publishers publish a topic on the blockchain and subscribers specify an interest message by making a deposit to subscribing the topic. Then, if the interest message matches the topic, the publisher transmits the encrypted content of the topic to the blockchain such that the subscribers can decrypt the ciphertext to obtain the content, and mark the publisher as its reputation. Finally, the publisher receives the payment from the subscriber. The new proposal provides confidentiality and reliability of data, anonymity of subscribers and payment fairness between the publishers and subscribers. Different from the traditional pub-sub services, no trusted third party is involved in our system due to employing blockchain technique. The security of the proposed SPS is analyzed as well. The implementation of the protocol on Ethereum of smart contract demonstrates the validity of SPS.

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