Performance Evaluation of Fully Homomorphic Encryption for End-to-End Cryptographic Communication in Multihop Networks

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Abstract— With the advent of a hyperconnected society, network services that connect the cloud and user terminals are emerging. Accordingly, the security technology that guarantees security and speed in end-to-end communication is becoming more important. Homomorphic encryption is useful in environments that require security in the end-to-end communication that can be operated without decryption. However, it is difficult to apply in an actual communication environment because the speed is slower than other encryption methods. In this study, we used fully homomorphic encryption and advanced encryption standards. And we built an end-to-end encryption communication network simulation environment that transmits data. Based on this, this study compares the transmission time according to the transmission environment. According to the experimental results of this study, a more effective encryption method can be selected and transmitted according to the length of the transmitted message, number of intermediate nodes, and encryption setting.

Keyword— Homomorphic encryption, network, communication, Advanced Encryption Standard, fully homomorphic encryption

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