Decentralized LoRa infrastructure using blockchain

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Decentralization is a very popular topic due to the surge of blockchain technologies which have permitted to bring the concept in areas where it was previously unbelievable, like for example in the field of finance. This master thesis presents a proof-of-work architecture and implementation to bring decentralization into the existing LoRa infrastructure. This is achieved thanks to the development of a new protocol, that we call LoRa-MAC, which replaces the existing LoRa WAN protocol. This new protocol is built on top of existing software and hardware for convenience. The decentralization aspect of LoRa-MAC is made possible thanks to the deployment of a smart contract on the Ethereum blockchain and thanks to the use of asymmetric cryptography which permits to provide non-repudiation. Furthermore, an extension of the project has been developed to demonstrate the new decentralized use-cases that are now allowed. This extension consists in the exchange of micropayments between the components of the LoRa-MAC architecture in a totally decentralized way in order to allow remuneration in crowd-sourced networks. A comparison of micropayments enabling technologies for the Ethereum blockchain is in addition realized.

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