Improvement and Implementation of IoT Device’ s Program Upgrade System on Cloud Platform

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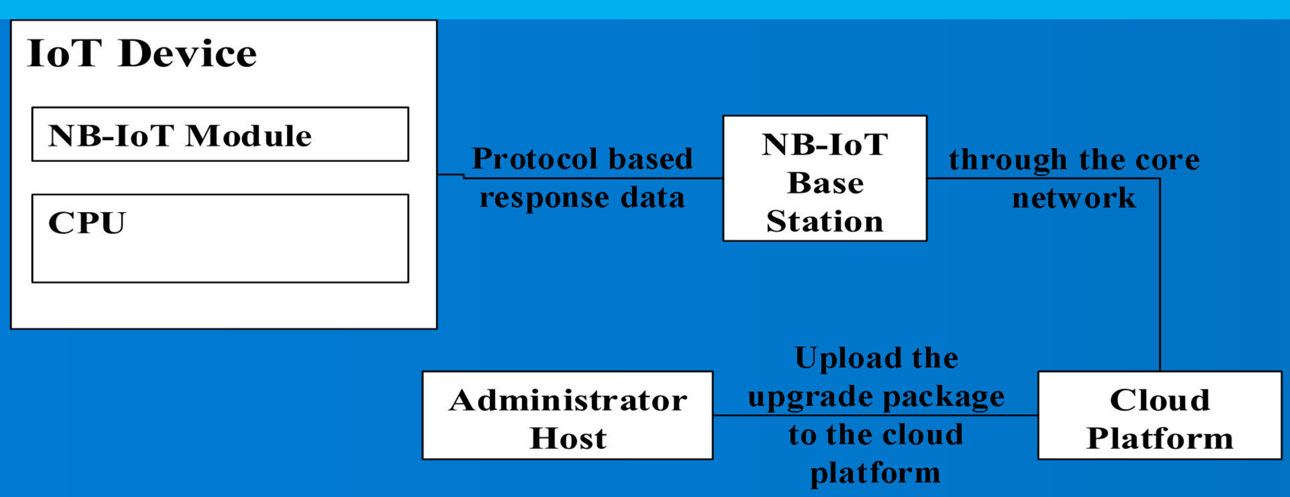
Introduction

In recent years, with the continuous advancement of IoT technology, the number of end devices has been huge and is still growing exponentially. The requirements for device functionality and performance upgrades are also becoming increasingly important. Since 2016, Padilla F J A and others have carried out systematic research on the inevitability of device upgrades, general standards and cloud platform upgrade systems[1-4], and related application research has also been carried out in China[5-10]. The three major domestic Telecom operators, including China Telecom[11-12], China Mobile and China Unicom, have also launched their own IoT cloud platforms to support the remote upgrade of user terminal devices.

However, due to the limitation of functional requirements and use costs, the CPU embedded in most IoT terminal devices is not very powerful, and most devices are powered by batteries. Therefore, the entire upgrade system is safe to use. The requirements for performance and upgrade efficiency are more stringent. The author has actually verified the device remote upgrade function of China Telecom's IoT cloud platform, and found that the function software is still insufficient in terms of upgrade efficiency and reliability.

Aiming at the above problems, this paper improves the data encryption and decryption method and data transmission protocol of the functional software, and tests it. The experimental results verify that this scheme has significantly improved the upgrade efficiency, reliability and other indicators.

Mechanism



Methods

First, modify the embedded software. The current shard number is stored at the end of the upgrade package issued by the cloud platform. Whenever an IoT device receives a complete upgrade package fragment, the fragment number is stored in the upgrade identification area. In this way, even in the case of transmission interruption or power failure, the device can identify the previous fragment location and request retransmission after restarting, thus improving the existing upgrade function of the platform and realizing the function of resuming transmission after power failure. .

This paper encrypts the uploaded HEX file using the M-sequence. This M-sequence is also preconfigured inside the device and decrypted using this sequence. The improvement of the upgrade system is also reflected in the modification of the protocol. The transmission efficiency is greatly improved by deleting redundant characters.

Results and discussion

As can be seen from the Fig., after repeated experiments, when the fragment size is 160 Bytes, the average upgrade time of NB is 7.67 seconds, and the average upgrade time of 4G is 1.04 seconds. As the fragment size increases, the average upgrade time slowing shrieking. The reason for this is that when the number of packets increases, the number of interactions increases and the uncertainty of network delay increases.

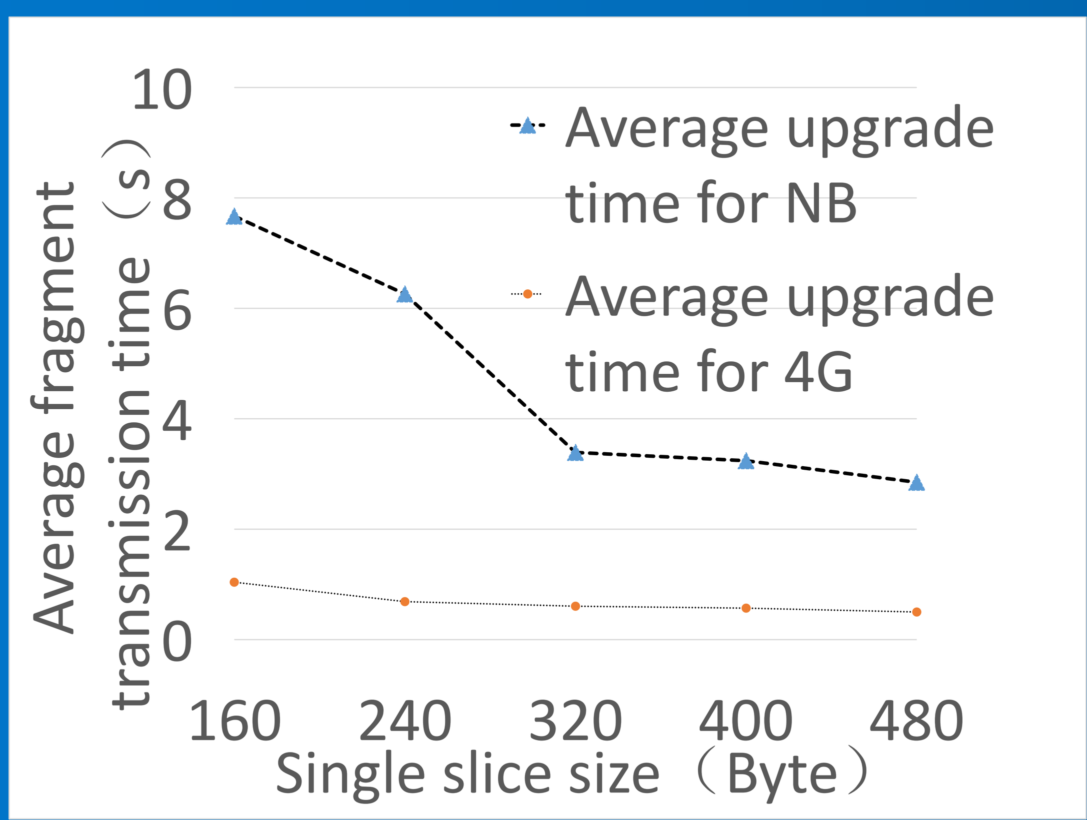


Fig .7 Comparison of the upgrade time of the two technologies

Conclusion

In this paper, the device software upgrade function of the Telecom IoT cloud platform is partially verified, and the protocol, security, break point resume and other parts of the software are improved and modified. The actual test results verify the availability of the modification, which can be promoted.

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