Pengiriman data ternekripsi melalui bluetooth low energy berbasis aplikasi android = Sending encrypted data via bluetooth low energy for android-based apps

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Abstrak

Perkembangan IoT device dalam kalangan masyarakat sudah semakin menjamur. Penggunaan teknologi nirkabel yang hemat energy khususnya ikut andil dalam membantu perkembangan IoT pada device yang berada di tangan konsumen. Bluetooth Low Energy BLE merupakan teknologi nirkabel berbasis frekuensi radio RF yang memiliki environment cukup luas di dunia. Dengan memanfaatkan teknologi tersebut produsen device dapat memproduksi device yang tetap hemat energy dalam mentransmisi data ke backend dari sistem IoT. Namun terdapat celah pada teknologi BLE yang dapat ditembus oleh peretas, dikarenakan peretas dapat melakukan perekaman paket-paket data yang dikirimkan melalui RF dengan teknik Sniffing. Oleh karena itu dibutuhkan sistem keamanan yang diimplementasikan pada sisi Application Layer yaitu dengan cara melakukan enkripsi data sebelum dikirimkan melalui RF.
Tugas akhir ini mengembangkan sistem keamanan pengiriman data terenkripsi pada aplikasi Android menggunakan metode enkripsi AES-256. Beberapa pengujian akan dilakukan terhadap BLE untuk segi teknis dan performa waktu proses enkripsi dan dekripsi dari metode AES-256 khusus untuk device Android.

Dari hasil pengujian tersebut didapatkan jarak jangkauan terjauh untuk melakukan Advertising sebesar 24 meter pada device Android yang digunakan untuk pengujian. Waktu rata-rata respon pengiriman data sebesar 113,2 ms untuk jarak terdekat kondisi tanpa sekat dan sebesar 214 ms untuk jarak terdekat kondisi dengan sekat. Interval rata-rata yang didapatkan pada mode Low Power adalah 0,789 s Selain itu performa waktu proses dari enrkipsi dan dekripsi cukup kecil yaitu sebesar 477,4 s dan 1804,6 s untuk percobaan ukuran Bytes terbesar sehingga tidak mengganggu performa transmisi data antara device Android.
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The development of IoT devices within the community has been increasingly mushrooming. The use of energy efficient wireless technology especially contributes in helping the development of IOT on a device that is in the hands of consumers. Bluetooth Low Energy BLE is a wireless technology based on radio frequency RF that has a wide enough environment in the world. By utilizing these technologies device manufacturers can produce devices that remain energy efficient in transmitting data to the backend of the IoT system. But there is flaws in BLE technology that can be penetrated by hackers, because hackers can record data packets sent via RF with Sniffing techniques. Therefore, it is necessary security system that is implemented on Application Layer side that is by doing data encryption before sending through RF.
This final project develops an encrypted data delivery security system on Android app using AES 256 encryption method. Some testing will be done on BLE for technical terms and performance of encryption and decryption process time of AES 256 method specific to Android device. From the test results obtained a combination of power saving Advertising settings and distance range to do Advertising on Android devices. In addition, the performance time of the process of encryption and decryption is small enough, so it does not interfere with data transmission performance between Android devices.

From the test results obtained the distance of the furthest distance to perform Advertising for 24 meters on the Android device used for testing. The average response time of data transmission is 113.2 ms for the closest distance of LOS condition and by 214 ms for the closest distance to the NLOS condition. Average advertising interval obtained in the Low Power mode is 0.789 s addition time performance of enrkipsi and decryption process is quite small in the amount 477.4 and 1804.6 for trial largest Bytes size that does not interfere with the performance of the transmission of data between Android devices.