Fuzzy Volt: A Zero Communication Authentication Scheme Based Electronic Noise from an Outlet

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1 INTRODUCTION

Voltkey is a new type of family WiFi access product intended to use no password authentication but retain the security and simplicity that password based authentication schemes have. To accomplish this, Voltkey implements an environmental authenticatio scheme. Due to many different types of living situations, there is a lack of environmental variables that remain consistant from a person's home. Therefore, the only reliable source of randomness lies within the wall, i.e the electricity. Electrical noise is not inheriently random. If an individual does not use any electronic devices within the residence, the noise remains consistant. Although, in the modern age of technology, the likelyhood of a residence not using any powersource besides a router and the Voltkey devices is miniscule. The implication of that a customer buys a Voltkey is based on the fact they have several devices that need fast and simple connection to the internet. Therefore, a person who uses Voltkey is much more likely to generate electrical noise from their devices.

2 DATASETS

2.1 Voltkey Data

One of the datasets we tested was a binary stream gathered from one Voltkey. The data gathered from the Voltkey used the entropy correcting methodologies described in Voltkey's earlier work. Voltkey's data passes a few of the NIST tests but not all. The NIST tests where the data was fed into tests binary stream randomness. The goal of these tests is to pass all of the tests to ensure that the randomness is secure enough to be used professionally. The raw translation data does not reflect a confident source of randomness. Although most would assume that isn't a good sign, the dataset actually is perfect for the Fuzzy Vault algorithm. After implementing a simple algorithm that reads the stream and adds some simulated error to the stream, we saw the entire stream was able to be read correctly.

2.2 EJScreen Dataset

The EJScreen dataset is environmental data gathered in a region. The set is perfect because it doesn't store only one type of data, rather it stores several different environmental variables gathered from the node in question's surroundings. Fuzzy vault is designed for sets like these. Fuzzy vault scales with noise within the network. Meaning, depending on the environment you can play into the noise to generate authentication keys.

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