

# Coding Smart Electricity Meters



This invention is an error control and correction-coding scheme designed to be implemented on smart electricity meters to prevent erroneous reading due to tampering or malfunction.

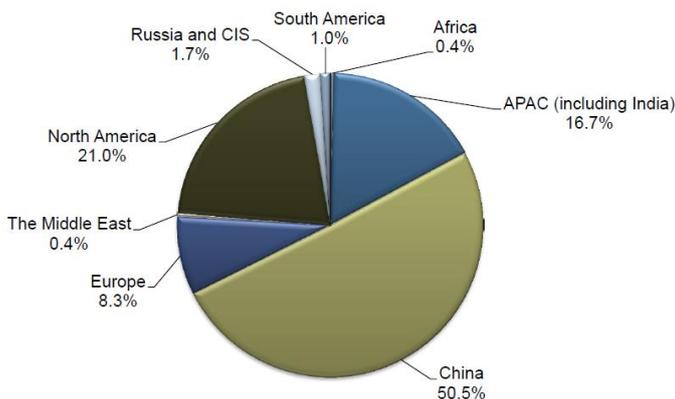
## The Invention

This invention is an algorithm that utilizes existing, highly efficient linear error-correcting codes in a novel way to identify and correct any erroneous data in the readings sent by smart electricity meters. Some of the most salient features of this algorithm are the following:

- Based on single error correcting codes which are simple to implement and computationally less complex.
- A complete implementation process, after accounting for practical challenges, is also contained in the invention.

## Market Need

As the the number of smart grid installations increase globally, smart electricity meters market has also increased with a CAGR of 1.1%, owing to reduced unit cost and large scale deployments in developing countries<sup>1</sup>.



With the grid connected meters becoming common, security of the user data has become paramount. Puerto Rico, for instance, saw its smart meter billing information hacked and tampered in 2009 resulting in losses of upto USD 400 Million with electricity bills reduced by 75% in some cases. Securing the data generated by the smart meters has become the new challenge for the industry as multiple encryption techniques make their way into the smart meter area.

## Applications

This invention has direct application in the area of smart electricity meters. The invented algorithm is to be programmed on the individual smart meters to detect and correct any erroneous readings if present.

## Competitive Advantage

Multiple error correcting strategies exist, but suffer from the following drawbacks:

- Computationally complex model requiring extensive processing abilities.
- Requirement of equal number of redundant smart meters to do the correction process.

The present invention is based directly on the well explored single-error correction codes making implementation fairly straight forward. Additionally, the correction process requires only a fraction of additional meters as compared to the competing algorithms making the implementation process less costly while providing high degree of error correction.

## Project Status

The project, in its current form, is a complete mathematical analysis and simulation of the invented algorithm. The devised algorithm has also been simulated on the Vertex 7 FPGA board and the results relate closely with the computer simulations in terms of error correction capability and time required for the correction.

## Looking for a Development Partner

Although the invented algorithm has been mathematically proven to be less computationally complex while being more accurate, a development/collaboration partner is required to:

- Provide facilities of implementing the invented algorithm on actual smart meters.
- Test the accuracy of this algorithm by implementing it on a batch of devices to verify the error correction abilities.

## Patent Protection

A patent application 15/042170 has been filed and is currently pending with the US patent office. KFUPM would like to talk to companies as described above that are interested in developing this technology.

## About KFUPM

King Fahd University of Petroleum & Minerals is a leading educational organization for science and technology. KFUPM Innovation & Industrial Relations is the IP management and technology licensing office tasked with taking innovation from lab to market place.

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<sup>1</sup> Global Smart Electricity Meters Market, Frost & Sullivan, Dec. 2016