TECHNO ECONOMIC ANALYSIS, DESIGN AND IMPLEMENT A SUITABLE COMMUNICATION METHOD FOR UTILITY SYSTEMS

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Declaration

“I declare that this is my own work and this thesis does not incorporate without acknowledgement any material previously submitted for a Degree or Diploma in any other University or institute of higher learning and to the best of my knowledge and belief it does not contain any material previously published or written by another person except where the acknowledgement is made in the text.

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M.S. Dunuweera                  Date

The above candidate has carried out research for the Masters Thesis under my supervision.

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(Dr. K.T.M.U Hemapala)

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Signature of the supervisor     Date
(Dr.Chandika Wavegedara)
Abstract

This thesis presents a research work which is carried out to optimize the Zigbee based remote meter reading network. There are various technologies available to automate the meter reading such as PLC, GSM, Optical fibre and RF technologies. As far as utilities providers are concerned, their focus is on a reliable RMR system to read the meter at minimum possible cost. The development of a reliable RMR system is highly dependent on telecommunication infrastructure which is costly if GPRS is used as a way of communication. Therefore, research were done in depth to analyse the cost and function of RMR system as large number of sensors are used in the electrical utility.

This particular research is on data concentrator based RMR system focusing on the analysing of communication delay and resource optimization.

In this research Matlab Simulink software was used for simulations and Visual Studio C# is used for creating the software. Several simulations were carried out in this research, for simulating communication speed, communication path and study the behaviour with the presence of noises.

As the final outcome of the research, software was developed for selecting Zigbee power rating based on GPS locations and generated algorithms for calculating communication delay and path which can be incorporated to the coordinator.
Acknowledgement

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<tr>
<td>RMR</td>
<td>Remote Meter Reading</td>
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<tr>
<td>RF</td>
<td>Radio Frequency</td>
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<td>GPRS</td>
<td>General Packet Radio Service</td>
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<td>GSM</td>
<td>Global System for Mobile Communications</td>
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<td>PLC</td>
<td>Power Line Carrier</td>
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<td>AMR</td>
<td>Automatic Meter Reading</td>
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<tr>
<td>SIM</td>
<td>Subscriber Identity Module</td>
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<tr>
<td>IOT</td>
<td>Internet of Things</td>
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<tr>
<td>RSSI</td>
<td>Received Signal Strength Indicator</td>
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<td>ZTR</td>
<td>ZigBee Tree Routing</td>
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<tr>
<td>STR</td>
<td>Shortcut Tree Routing</td>
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<tr>
<td>AODV</td>
<td>Ad Hoc On Demand Distance Vector</td>
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<tr>
<td>DSDV</td>
<td>Destination Sequenced Distance Vector</td>
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<tr>
<td>TOD</td>
<td>Time Of Day</td>
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<tr>
<td>OBIS</td>
<td>Object Identification System</td>
</tr>
<tr>
<td>EDIS</td>
<td>Energy Data Identification System</td>
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<tr>
<td>LQI</td>
<td>Line Quality Index</td>
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<tr>
<td>LED</td>
<td>Light Emitting Diode</td>
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<tr>
<td>LD</td>
<td>Laser Diode</td>
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