LOW LATENCY MAC PROTOCOL FOR INDUSTRIAL WIRELESS SENSOR NETWORK

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THESIS

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ABSTRACT

Electronic devices are adaptable and easy to use. These devices can be used to measure both static and dynamic signals. Sensors are electronic devices used to convert a physical parameter to an electric output. They can be used through wired or wireless devices which can then form a network to monitor an area. Future of digital world now relies on internet and integration of devices with internet to generate and consume information**.** The target of thesis is industrial environment monitoring, so moving towards this, we need to monitor machine health, entity observation, environment cleaning etc. Devices used depends on certain parameters like battery efficiency, throughput, reliability, security and latency. Latency range varies from application to application. For industrial domain, typical range is around 10 ms, for process control, it is in seconds, and for asset monitoring, in minutes. Wireless Sensor Network (WSN) are attaining greater attention in today's world due to their low cost deploy ability and mobility. IWSN(Industrial Wireless Sensor Network) need to possess certain capabilities such as self- organization, flexibility, energy efficiency ,rapid deployment(to name a few) to combat industrial automation requirements. Because sensor nodes are subject to dynamic topologies, nodes are battery powered, data redundancy exists, packet errors occurs , large scale deployment requirement etc. Certain protocols have been developed till now that provides promising solution to these problems, some of these protocols are wireless HART, ISA100.11A, 802.15.4, 802.15.4e etc. but some constraints do apply when it comes to counter harsh industrial environment.

In this thesis report, a comparative study of available IWSN protocols is presented. Moreover, the details for selection of 802.15.4 protocol and importance of proposed network in achieving low latency is also provided in the thesis. It can be concluded from the thesis that these state of the art protocols produces promising solutions to wireless networking problems, however they introduce complexity and in turn introduces latency issues at the cost of reliability within the network. To resolve this issue, a Low Latency MAC (LLMAC) protocol for IWSN, based on another novel proposed protocol NCAMAC (Network Coded-Aggregated MAC), is proposed for industrial applications to minimize hazards caused by latency, to provide an optimized throughput and better network lifetime.

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