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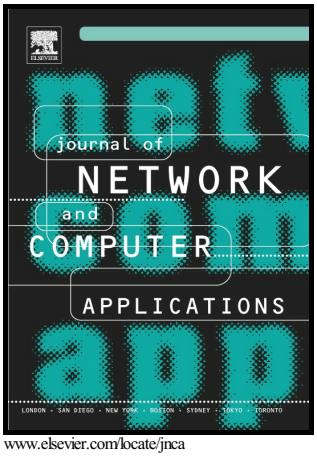

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Survey on Low Power Real-Time Wireless MAC Protocols

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Abstract

Wireless low-power technologies have been the focus of a large research effort, for example, in the wireless sensor network and other short range technologies domains. Although bringing extended autonomy to battery powered stations, such technologies are known to be negatively influenced by similar technologies contending for the medium and, especially, by technologies using higher power transmissions over the same frequency bands. A frequency band that is becoming increasingly crowded with competing technologies is the 2.4 GHz Industrial, Scientific and Medical band, encompassing, for example, Bluetooth and ZigBee, two low-power communication standards which are the base of several real-time protocols. Although these technologies employ mechanisms to improve their coexistence, they are still vulnerable to transmissions from uncoordinated stations with similar technologies or to higher power technologies such as Wi- Fi, which hinders the support of wireless dependable real-time communications in open environments. Therefore, this survey presents a comprehensive study of the most commonly used wireless low-power technologies operating in the 2.4 GHz Industrial, Scientific and Medical (ISM) band and real-time protocols built upon them. The survey of the real-time protocols using these technologies is focused on factory automation applications, due to their more demanding timeliness and reliability requirements.

1. Introduction

The plethora of new application areas of Internet of things (IoT) has raised concern about the inter-connectivity of wide variety of devices [1]. In addition, these new concepts have made the research community to ensure the consideration and processing of data generated from all the sources including small devices (sensors) and made it available on the internet [2]. Major companies like Ericsson, Cisco, and Huawei have already predicted the number of these connected devices in the future. For example,

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