

Master Thesis
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**Discrete-Event Simulation of
Industrial Ethernet Based Coexistence Management**

Abstract

In recent years, wireless communication is being used worldwide leading to the next level of communication. Industries using wired technologies are transforming to wireless technologies. Many automation industries are increasingly equipped with wireless communication systems. These wireless industries require efficient spectrum usage. Heterogeneous wireless networks are expected to coexist in the unlicensed ISM (Industrial, Scientific and Medical) 2.4 GHz radio band. It is an important concern for the industrial wireless device to work without interference. In order to manage interference coexistence management is introduced. An efficient coexistence management is required to maximize spectrum utilization and also to avoid interference. Coexistence can be managed using frequency, time and space.

In this thesis, a wireless network such as WLAN and WirelessHART connected to a Industrial Ethernet (IE) backbone is considered. Coexistence is managed using frequency channel allocation. To examine coexistence a controller that centrally coordinates the wireless devices is established as Central Coordination Point (CCP) using Simple Network Management Protocol (SNMP). SNMP is a network monitoring protocol used to collect information about the managed devices. A problem scenario is considered with WLAN and WirelessHART connected to CCP through IE. This scenario is used to investigate and evaluate the performance of coexistence management using a discrete-event simulation framework. The focus of this master thesis is to manage coexistence in the unlicensed 2.4 GHz ISM band efficiently and to investigate the problem scenario using an appropriate simulation methodology.

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