Routing with Dijkstra in Mobile Ad-Hoc Networks

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Abstract. It is important for robot teams to have an effective communication infrastructure, especially for search and rescue robots operating in a disaster area covered with debris. In a large area of disaster, the robots cannot stay connected to a central operator. In such situations, robots should be able to move around without losing communication with each other by passing messages from one to another up to the central operator. Routing methods determine the best path for conveying messages between nodes. In this work blind flooding and table-based routing methods are tested for three different scenarios, using the simulation environment USARSIM and its wireless simulation server WSS. Message delay times and maximum data packet streaming rates are considered to compare the effectiveness of both methods. Although it has some deficiencies, it is observed that the table-based approach is more advantageous than the blind flooding.

Keywords: Mobile ad-hoc networks, Routing protocols, USARSim, WSS.

1 Introduction

In recent years, the importance of the teleoperation of mobile robots and teams of mobile robots increased. More and more mobile robots are being developed, which are capable of operating in impassable or hazardous environments, with little or no communication infrastructure [2]. Along with technological advances, robots became much more intelligent and much more capable. As a result, the requirement for the robots to possess the capability of constructing a network and performing cooperative tasks has appeared [1].

A key driving force in the development of cooperative mobile robotic systems is their potential for reducing the need for human presence in dangerous applications. Such applications, as the disposal of toxic waste, nuclear power processing, fire-fighting, civilian search and rescue missions, planetary exploration, security, surveillance and reconnaissance tasks, are all have elements of danger. In such cases, wireless communication provides a low-cost solution for mobile robot networks to cooperate efficiently [1].