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Research Article

Ensuring Reliable Communication in Disaster Recovery Operations with Reliable Routing Technique

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The purpose of this research paper is to ensure reliable and continuous communication between the rescue officers and other people during disaster recovery and reconstruction operations. Most of the communication infrastructure gets damaged during the disaster and proper communication cannot be established in the area which leads to longer delays in emergency operations and increased damage to life and property. Various methods proposed to enable communication between the people using wireless ad hoc networks do not guarantee reliable delivery of data with fast moving devices. This paper presents a Reliable Routing Technique (RRT) that ensures reliable data delivery at the destination device even when the people with the mobile devices are moving in the network. We make use of the broadcasting property of the wireless network and create a priority list of probable forwarding candidates at each device. With this technique, RRT ensures that if a forwarder device is unable to forward the data packet due to movement of mobile devices, the next priority candidate forwards the data packet to the destination device, thus ensuring reliability of data delivery in the network. Simulation results show that RRT achieves significant performance improvement with better data delivery in ad hoc networks.

1. Introduction

The world has witnessed a number of natural disasters over these years, causing huge losses to human and animal life, infrastructure, and almost everything in the region. These natural hazards like earthquakes, floods, and hurricanes have always struck in different places at unpredictable times, leading to the increase in damage of life and property. Although science has made vast progress in many areas, scientists are still unable to accurately predict the time and place of these disasters and the extent of damage that might occur. The Indian Tsunami in 2004 [1, 2] is one among many that have made us realize the extent of damage a natural disaster can cause in unpredictable situations. So the major focus has always been on minimizing the damage that might be caused by a natural disaster and to stay ready for disaster recovery and reconstruction operations [3].

Disaster recovery and reconstruction operations have always been a challenging task for the government, local authorities, and the people. The primary aim of the firemen, police officers, local guards, and other rescue officers arriving just after the event is to look for the survivors and to help the injured. These first responders arriving at the site immediately after the disaster have to deal with a number of issues and challenges. In some cases it is necessary for them to prevent the damage from spreading to other areas. They have to search for the survivors within the damaged buildings and also have to make sure that the medical assistance reaches the survivors in minimum time. Once the survivors are found and medical assistance is given, the next major task is to rebuild the basic infrastructure to start the reconstruction works. A major issue during these recovery and reconstruction operations is that most of the infrastructure used for transportation, communication, and so forth would have been completely or partially damaged