

論 文 要 旨

Thesis Abstract

(yyyy/mm/dd) 2021 年 02 月 14 日

※報告番号	甲第 287 号	氏 名 (Name)	OYAKHIRE OMUWA
<p>主論文題名 (Title)</p> <p>SELF-ORGANIZING REMOTE BROADCASTING IN RURAL AREAS USING WIRELESS AD-HOC NETWORKS</p>			
<p>内容の要旨 (Abstract)</p> <p>Broadcast companies use remote broadcasting to stream high quality feeds from a remote end to the studio end for broadcast production. This remote broadcasting feature is popularly used during emergency broadcasts, among other situations. Remote broadcasting has evolved over the years, from analog broadcasting to ISDN services. As most countries discontinue ISDN services, most broadcast companies shift to Internet Protocol (IP) networks for remote broadcasting. These networks could be private networks or the Internet required to comply with strict Quality of Service (QoS) standards for remote broadcasting. One benefit of these networks is that remote broadcasting can be set up anywhere and anytime. In Africa, remote broadcasting over internet networks is increasingly used due to mobile telecommunication networks from 2000. Although many urban areas in Africa have access to telecommunication networks, rural or remote areas have few or are lacking telecommunication infrastructure. Thus, remote broadcasting in rural areas may pose a difficulty. One way to solve this problem is to use wireless devices easily accessible to form a wireless ad-hoc network. Most wireless devices can participate in an ad-hoc network using its embedded wireless ad hoc technology. A wireless ad-hoc network is a decentralized network that does not rely on a pre-existing infrastructure and can spontaneously form a network where all nodes participate by receiving and forwarding data to other nodes.</p>			

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<p>内容の要旨(Abstract) <i>cont.</i></p> <p>These networks are suitable where central infrastructure is undesirable. The possible applications range from sensor networks to emergency communications. This dissertation aims to implement remote broadcasting over a wireless ad-hoc network that can be operable in practical scenarios, especially in rural areas. The contribution of this research is summarized as follows:</p> <ul style="list-style-type: none"> • First, a novel ad-hoc protocol, Node density Optimized Link State Routing Protocol (ND-OLSR), is proposed for remote broadcasting. Routing is one of the critical factors that affect an ad hoc network's performance, especially a highly dynamic network. ND-OLSR is based on game theory and is an improvement of OLSR. ND-OLSR provides a novel computation for the nodes' willingness to forward traffic to other network nodes. • Second, a simulation experiment of ND-OLSR was carried out in dense networks. The simulation experiment aimed to test ND-OLSR routing traffic performance. The network is highly dynamic as all nodes except the source and destination are moving randomly using the Random Waypoint (RWP) Model. The evaluation results show that the routing overhead traffic and the Multipoint relay (MPR) ratio were reduced significantly in all scenarios compared to OLSR. Furthermore, the packet delivery ratio was increased by an average of 5.1% in all scenarios compared to OLSR. • Third, ND-OLSR for remote broadcasting was implemented over a realistic testbed experiment. It is essential to validate the proposed protocol and measure the Quality of Service (QoS) results (delay, jitter, packet loss) for remote broadcasting. The application data results were compared with OLSR and the standard level agreement (SLA) standards for remote broadcasting. The results showed that an average of 52% reduced delay and packet loss was reduced by over 87%. This proves that ND-OSLR performs better than OLSR for remote broadcasting. 			

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