

ABSTRAK

Bencana alam dapat menyebabkan kerusakan infrastruktur komunikasi sehingga proses koordinasi dan penyampaian informasi pada kondisi pasca bencana menjadi terganggu. Salah satu solusi komunikasi darurat yang dapat digunakan adalah MANET karena mampu membentuk jaringan secara mandiri tanpa bergantung pada infrastruktur tetap. Penelitian ini bertujuan untuk merancang simulasi jaringan MANET serta menganalisis performa protokol routing AODV, DSDV, dan OLSR pada skenario komunikasi darurat pasca bencana. Pengujian dilakukan menggunakan variasi jumlah node 10, 20, 40, dan 60 node dengan luas area 250×250 m, 500×500 m, dan 750×750 m. Parameter yang dianalisis meliputi throughput, Packet Delivery Ratio, packet loss, dan end-to-end delay. Hasil pengujian menunjukkan bahwa peningkatan jumlah node hingga 40 node cenderung meningkatkan performa jaringan, namun performa menurun pada 60 node akibat meningkatnya kepadatan jaringan dan kompleksitas routing. Pada luas area 250×250 m, skenario terbaik diperoleh protokol OLSR dengan 20 node yang menghasilkan throughput 256.97 kbps, PDR 100%, packet loss 0%, dan end-to-end delay 1.94 ms. Pada luas area 500×500 m, skenario terbaik diperoleh protokol OLSR dengan 40 node yang menghasilkan throughput 250.77 kbps, PDR 97.76%, packet loss 2.24%, dan end-to-end delay 5.87 ms. Sedangkan pada luas area 750×750 m, skenario terbaik diperoleh protokol OLSR dengan 40 node menghasilkan throughput 174.57 kbps, PDR 76.38%, packet loss 23.62%, dan end-to-end delay 34.83 ms. Berdasarkan hasil pengujian dan analisis yang dilakukan, protokol OLSR dinilai lebih cocok digunakan pada komunikasi darurat pasca bencana.

Kata Kunci : MANET, OLSR, AODV, DSDV, Bencana

ABSTRACT

Natural disasters can damage communication infrastructure, causing coordination and information delivery during post-disaster conditions to become disrupted. One emergency communication solution that can be used is MANET because it is capable of forming a network independently without relying on fixed infrastructure. This study aims to design a MANET network simulation and analyze the performance of the AODV, DSDV, and OLSR routing protocols in post-disaster emergency communication scenarios. The simulation was conducted using variations of 10, 20, 40, and 60 nodes with simulation areas of 250×250 m, 500×500 m, and 750×750 m. The analyzed parameters include throughput, Packet Delivery Ratio, packet loss, and end-to-end delay. The results show that increasing the number of nodes up to 40 tends to improve network performance; however, the performance decreases at 60 nodes due to increased network density and routing complexity. In the 250×250 m area, the best scenario was achieved by the OLSR protocol with 20 nodes, resulting in a throughput of 256.97 kbps, 100% PDR, 0% packet loss, and 1.94 ms end-to-end delay. In the 500×500 m area, the best scenario was also achieved by OLSR with 40 nodes, resulting in a throughput of 250.77 kbps, 97.76% PDR, 2.24% packet loss, and 5.87 ms end-to-end delay. Meanwhile, in the 750×750 m area, the best scenario was achieved by OLSR with 40 nodes, resulting in a throughput of 174.57 kbps, 76.38% PDR, 23.62% packet loss, and 34.83 ms end-to-end delay. Based on the results of the testing and analysis, the OLSR protocol is considered more suitable for post-disaster emergency communication.

Keywords: MANET, OLSR, AODV, DSDV, Disaster