INDONESIAN E-HEALTH GRID LINK BANDWIDTH RECOMMENDATION

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Abstract

Most of the agencies and institutions including government agencies and hospitals utilize information technology to improve efficiency and effectiveness nowadays. Implementation of information technology in the health sector (e-Health) is expected to enhance the performance of health services to the community. In this research, we investigate e-Health Grid based on the provincial hospital in Indonesia using Mininet emulator. Actual distances between hospitals are applied. Approaching packet rate is determined based on the assumption that is proportional to the population served by the hospital. The e-Health Grid connects 34 hospitals with four controllers and four switches. The result of the simulation is a recommendation of link bandwidth that provides minimum round trip time from each node in the Grid.

Keywords : e-Health, Grid, Bandwidth

Simulation

We have evaluated and analyzed the performance of topology proposed in the simulation using Mininet. The simulation run in actual distance among hospitals in Indonesia. We set two scenarios with different link bandwidth (100 Mbps and 50 Mbps) and investigate the round trip time (rtt).

	From	To	Link Bandwidth (MBps)
Region 1 Sumatra's Provinces	RSU Lahat Palembang Hospital	RSUD Lahat Palembang	50
		RSUD Pandan	50
		RSUD Dr. Achmad Darwis	50 or 100
		RSUD Provinsi Kepulauan Riau Tanjungpinang	50
		RS Otorita Batam	50
		RS Siloam Jambi	50 or 100
		RS Bhayangkara Jitra	50
		RS Bhayangkara	50
		RSUD Kabupaten Belitung	50
Region 2 J awa, Bali & Nusa Tenggara's Provinces	RSUD Dr. M. Soewandhie Hospital	RS Dr. Cipto Mangunkusumo	50
		RS Hasan Sadikin	50
		RSUD Banten	50
		RSU Ambarawa	50
		RS Bethesda Yogyakarta	100
		RS Trijata Polda Bali	50
		RSUD Kab. Sumbawa Barat	100
		RSUD Kota Kupang	50
Region 3 Kalimantan's & Sulawesi's Provinces	RSU Labuang Baji Hospital	RSUD Landak	50
		RSUD Lamandau	50
		RSU Datu Sanggul Rantau	50
		RSUD Am Parikesit Tenggarong	50
		RSUD Tarakan	50
		RSU Datoe Binangkang	100
		RSU Majene	50
		RSU Anutapura Palu	100
		RSUD H.M Djafar Harun	50
Region 4 Maluku's & Papua's Provinces	RSUD Dr. M. Haulussy Hospital	RSU Prof Dr H Aloei Saboe	50
		RSU Ternate	50
		RSUD Kaimana	50
		RSUD Tiom	50

Table 1. Recommendation of bandwidth link for nodes on the topology of e-Health Grid in Indonesia

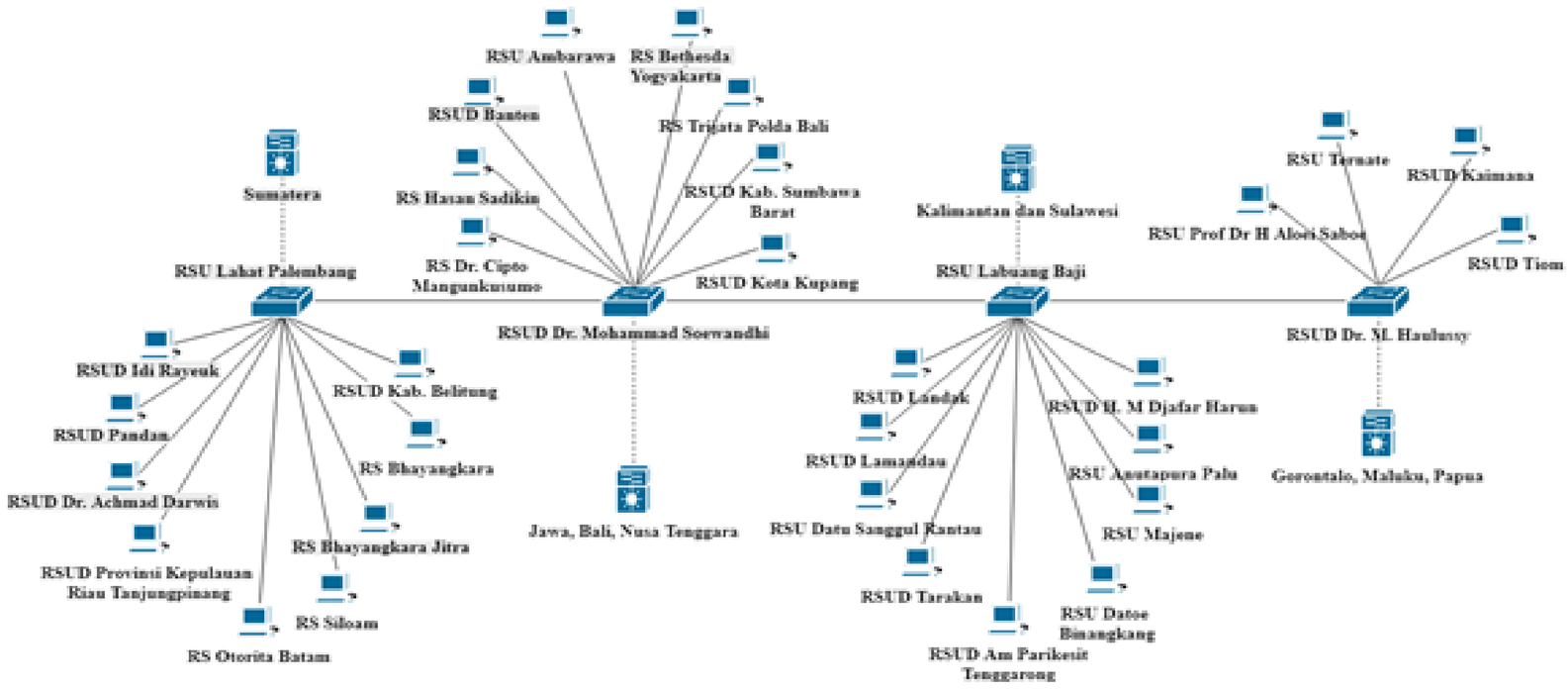

Figure 1 : Indonesia e-Health Grid Topology Based on Province

Results

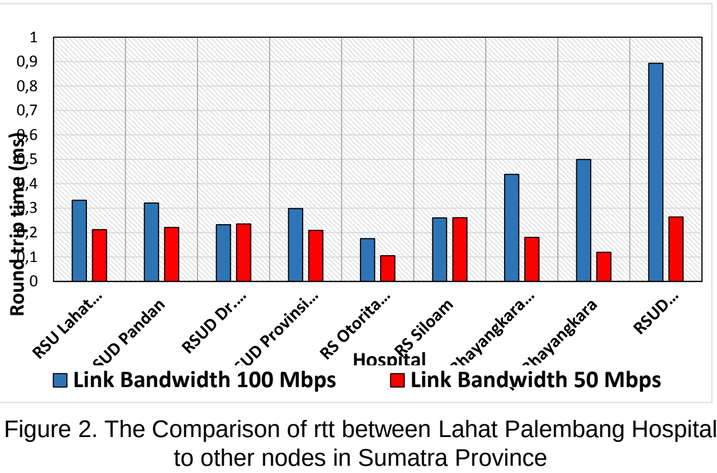

Figure 2. The Comparison of rtt between Lahat Palembang Hospital to other nodes in Sumatra Province

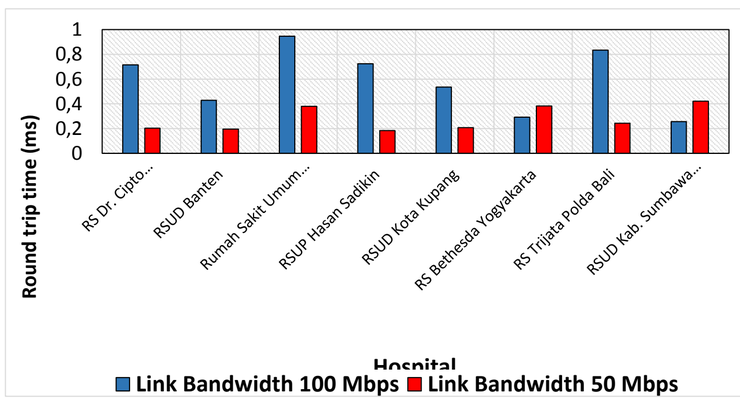

Figure 3. The Comparison of rrt between Dr. M. Soewandie Hospital to other nodes in Jawa, Bali, and Nusa Tenggara Provinces

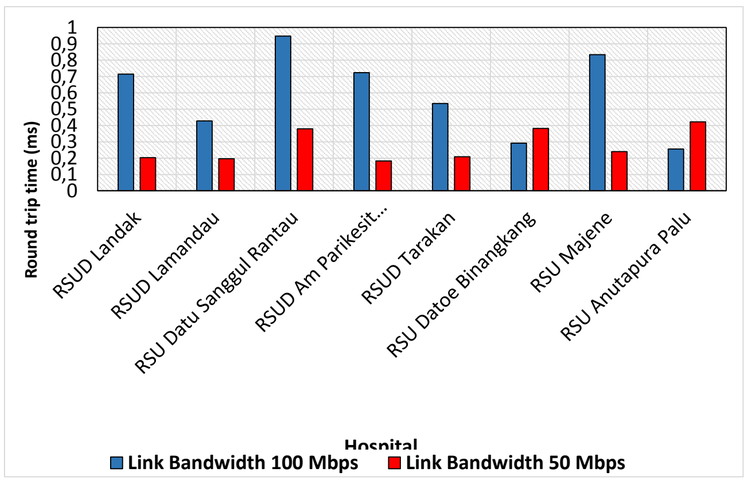

Figure 4. The Comparison of rtt between Labuang Baji Hospital to other nodes in Kalimantan and Sulawesi Provinces

Acknowledgement

This work under the support of Indonesian Ministry of Research and Technology and Higher Education, Directorate General of Higher Education Excellent Research Grants Number 105/K3/KM/2016.

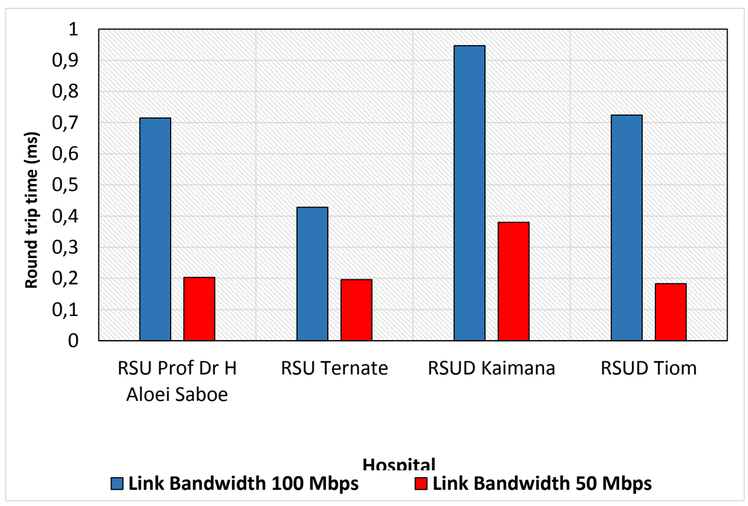

Figure 5. The Comparison of rtt between Dr. M. Haulussy Hospital to other nodes in Gorontalo, Maluku, and Papua Provinces

Conclusion

In this research, e-Health Grid for hospitals in Indonesia had been simulated using Mininet. The simulation employed actual distance between hospitals and assumption of packet rate based on the population of provinces.

As a result, we obtained the recommendation of link bandwidth that provides minimum round trip time from each node in the Grid.

Future Works

We will continue the research by testing e-Health Grid for Indonesia based on referral hospitals and other scenarios. Mininet emulator facilitates the analysis of e-Health Grid to in a testbed.

References

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