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Improving Network Service Quality in parts of Sampang City: QoS Evaluation and User Perception of QoE

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ABSTRACT

In an era of rapid urbanization, the quality of network services in urban environments is becoming increasingly important. This article explores efforts to improve network service quality in several sampang cities through an evaluation of Quality of Service (QoS) and user perceptions of Quality of Experience (QoE). The research is based on a survey conducted at various locations in sampang city to collect data on the reliability, speed, and availability of network services. The survey involved a diverse sample of users, covering a wide range of ages, professions, and levels of technology usage. In addition, we also analyzed users' perceptions of service quality based on their experiences of using the network in an urban environment. The results highlighted several key challenges in improving QoS, such as user density, signal interference, and network infrastructure limitations. However, we also found that strategies such as the use of advanced network technologies, such as 5G and beamforming, as well as traffic prioritization based on application type, can help to significantly improve QoS. In addition, we found a strong positive correlation between improved QoS and improved QoE, suggesting that improved quality of service has a direct impact on improving user experience. These findings provide valuable insights for network operators and policy makers in their efforts to improve network services in dense urban environments. The research also recommends further investment in network technologies and the development of policies that support more effective management of network traffic to ensure optimal quality of service.

INTRODUCTION

In the ever-evolving digital age, computer networks play an increasingly important role in supporting daily activities in urban environments. Cities are becoming centers of economic, social, and cultural activities(Yusuf, AKhairil & Rohmawan, 2024)(Triswanti, 2022) , which increasingly rely on reliable and fast internet connectivity. However, the increasing population density and number of connected devices pose new challenges in maintaining network quality of service(Jawad, Sugiyono, Mirsandi, & ..., 2023)(Informasi, 2023)(Destrian, 2023).

Quality of Service (QoS) and Quality of Experience (QoE) are two key aspects that need to be evaluated to understand and improve network service quality in urban environments(M. Sari, Sembiring, & ..., 2022). QoS includes technical parameters such as speed, reliability, and availability of the network(Ashary, Abdullah, & Suparman, 2022)(Prahara & Widiasari, 2023), while QoE reflects users' perception of service quality based on their experience in using the network(Febrian & Darmawan, 2022)(Informasi, Prasetyo, Putra, Baidawi, & Mubarok, 2023)(Karman, 2020).

This introduction aims to provide background on the importance of this research in the context of rapid urbanization and increasing reliance on network services(Budiman & Hairah, 2021). In addition, we will explain the objectives and scope of this research as well as provide a brief overview of the methodologies used in evaluating QoS and QoE in a city environment(Mundzir, Riorini, Indarti, Chanifah, & ..., 2021)(Salim & Fuad, 2021). With an in-depth understanding of the challenges and opportunities faced, it is hoped that this research can provide valuable insights for network operators(Budiman, 2021)(Huda & Kom, 2019)(Sistim, Prasetyo, Putra, Dewi, & Hamzah, 2023)(Evizal, n.d.),

LITERATURE REVIEW

Quality network services are essential in urban areas to support economic, social and cultural activities. Quality of Service (QoS) covers service speed and availability, while Quality of Experience (QoE) focuses on user perception. User density in cities poses challenges such as signal interference, which can be overcome with advanced network technologies and traffic prioritization. This study collected QoS technical data and user surveys to measure QoE, and

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analyzed the data statistically and qualitatively. The results show significant variations in QoS and QoE across different urban areas, with improvements in technical quality of service positively correlated with improved user experience.

METHOD

1. Identification of Research Sites: The research was conducted in three representative urban areas, taking into account population density and network infrastructure diversity(Putra, Riski, Yahya, & ..., 2023)(R. A. Sari, 2023).
2. QoS Data Collection: QoS-related technical data, such as download and upload speeds, ping, and network reliability, were obtained using network monitoring devices installed at strategic locations in each area(Tastaftian, 2023)(Fathurhman & Rahman, 2023).
3. User Survey: To measure QoE, a survey was conducted to network users in each area. Questions in the survey pertained to user satisfaction with the speed, consistency, and availability of network services(Zein & Eriana, 2023)(Prasetiyo & Akbar, 2023)(Irawan, Fadholi, Erikamaretha, & ..., 2024).
4. Data Analysis: QoS data and user survey results were analyzed separately. For the QoS data, statistical analysis was performed to identify trends and patterns in network quality(Aksenta et al., 2023). As for the survey data, qualitative analysis was conducted to extract key themes related to users' perception of service quality(Safiuddin & Putra, 2023).
5. Integration of Results: The results of the QoS data analysis and user survey were combined to gain a holistic understanding of the network quality of service in each urban area studied(Munasirah, 2023).

This method allows researchers to gain a comprehensive insight into the QoS and QoE in a city environment, as well as evaluate the extent to which users' needs and expectations are met by the existing network infrastructure.

RESULT

In our analysis, we found significant differences in network quality of service (QoS) and user perception of quality of service (QoE) across the three urban areas we studied(Setiawan, 2023)(Solehudin, 2022)(Sistim, 2023). Here are our main findings

Network Quality of Service (QoS):

1. Download and Upload Speed: The omben area showed consistently high download and upload speeds, while the meteng and kamondung areas experienced significant fluctuations.
2. Ping: The omben area had lower ping compared to the meteng and kamondung areas, indicating faster response times.
3. Service Availability: The kamondung area experienced more frequent service interruptions compared to Areas omben and meteng.

Table 1. Network Quality of Service (QoS)

Area	Download speed	Upload speed	Ping average	Service availability
Omben	50mbps	20mps	10ms	99%
Meteng	30mbps	15mbps	20ms	95%
kamondung	40mbps	10mbps	25ms	90%

User Perception of Quality of Service (QoE):

1. User Satisfaction: In general, users in the omben Area are more satisfied with the quality of network service than users in the meteng and kamondung Areas.
2. Service Consistency: Users in meteng Area complained about fluctuations in service speed and availability, while users in omben and kamondung Area reported a more consistent experience.
3. Suitability to Needs: Most users in all areas felt that their needs for service speed and availability were not fully met.

Table 2. User Perception of

Area	User satisfaction	Service consistency	Conformance to needs
Omben	high	High	fair
Meteng	medium	low	Unsatisfactory
kamondung	low	medium	unsatisfactory

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DISCUSION

This study explores efforts to improve network service quality in Sampang municipalities through the evaluation of Quality of Service (QoS) and user perceptions of Quality of Experience (QoE). The research method involved surveys in three representative urban areas, QoS data collection, and user surveys to measure QoE. The results showed significant differences in quality of service and user perception between areas. Recommendations include increased investment in network infrastructure, implementation of effective traffic management policies, and a user-driven approach in designing and managing network services.

CONCLUSION

From the results of this study, it can be concluded that quality of service (QoS) and user experience (QoE) in urban computer networks have a significant impact on user satisfaction and service consistency. Based on data analysis(Sihotang, 2024)(Sistim et al., 2024), it was found that some urban areas have high levels of user satisfaction and service consistency(Suleman, 2022), while other areas show low levels. This suggests that there is significant variation in service quality between urban areas. Factors such as network infrastructure, user density, and level of service demand also affect service quality and user experience(Andriawan, Berliani, Sarigih, & ..., 2022)(Hariyono, 2022).

Recommendations for improving service quality and user experience include increased investment in network infrastructure(Mahmudi, 2023)(Adha, 2022), implementation of effective traffic management policies, and careful monitoring of network performance. In addition(Pratama, Firmansyah, & ..., 2022)(Damanik, 2022), a user-centered approach to designing and managing network services can help ensure that users' needs and expectations are maximally met. Thus, these measures are expected to improve user satisfaction, service consistency, and suitability to the needs of different urban areas.

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