

ABSTRAK

Maulidani, Moh. Iqbal. 2026. Implementasi Manajemen Bandwidth Berbasis Per Connection Queue (PCQ) untuk Meningkatkan Kualitas Layanan Jaringan Di SMP Negeri 3 Balung. Tugas Akhir. Program Sarjana. Program Studi Teknik Informatika. Universitas Muhammadiyah Jember.

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Seiring meningkatnya pemanfaatan internet di sekolah, kebutuhan terhadap kualitas layanan jaringan (Quality of Service / QoS) yang stabil dan merata menjadi sangat penting. Penggunaan aplikasi pembelajaran daring, sistem administrasi berbasis web, serta pelaksanaan Tes Kemampuan Akademik (TKA) menyebabkan peningkatan lalu lintas jaringan, khususnya pada jam sibuk. Kondisi ini menuntut adanya pengelolaan bandwidth yang efektif agar seluruh pengguna memperoleh akses internet yang stabil. Penelitian ini menerapkan metode *Per Connection Queue* (PCQ) pada router MikroTik untuk mengatur pembagian bandwidth secara otomatis dan proporsional pada jaringan di SMP Negeri 3 Balung. Metode PCQ bertujuan mencegah penggunaan bandwidth secara berlebihan oleh pengguna tertentu serta menjaga kestabilan jaringan saat terjadi lonjakan trafik. Hasil penelitian menunjukkan bahwa sebelum penerapan PCQ, pembagian bandwidth antar client belum merata. Setelah penerapan PCQ dengan total bandwidth 50 Mbps, bandwidth dapat terbagi secara otomatis dan seimbang kepada client aktif, sehingga penggunaan jaringan menjadi lebih stabil. Analisis Quality of Service (QoS) menggunakan Wireshark menunjukkan peningkatan performa jaringan, yaitu throughput meningkat dari 654 Kbps menjadi 764 Kbps, delay menurun dari 12,93 ms menjadi 10,63 ms, dan packet loss tetap berada pada 0%. Berdasarkan hasil tersebut, penerapan manajemen bandwidth menggunakan metode PCQ terbukti mampu meningkatkan pemerataan penggunaan bandwidth serta kualitas layanan jaringan di SMP Negeri 3 Balung, sehingga aktivitas berbasis internet di lingkungan sekolah dapat berjalan lebih optimal.

Kata Kunci : Manajemen Bandwidth dan *Per Connection Queue* (PCQ)

ABSTRACT

Maulidani, Moh. Iqbal. 2026. *Implementation of Bandwidth Management Based on Per Connection Queue (PCQ) to Improve Network Quality of Service at SMP Negeri 3 Balung*. Undergraduate Thesis. Bachelor's Program. Informatics Engineering Study Program. Universitas Muhammadiyah Jember.

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Along with the increasing use of the internet in schools, the need for stable and evenly distributed network service quality (*Quality of Service / QoS*) has become very important. The use of online learning applications, web-based administrative systems, and the implementation of Academic Competency Tests (*Tes Kemampuan Akademik / TKA*) has led to increased network traffic, especially during peak hours. This condition requires effective bandwidth management to ensure that all users obtain stable internet access. This study implements the *Per Connection Queue (PCQ)* method on a MikroTik router to regulate bandwidth distribution automatically and proportionally within the network of SMP Negeri 3 Balung. The PCQ method aims to prevent excessive bandwidth usage by certain users and to maintain network stability during traffic spikes. The results show that before the implementation of PCQ, bandwidth distribution among clients was uneven. After implementing PCQ with a total bandwidth of 50 Mbps, the bandwidth was automatically and evenly distributed among active clients, resulting in a more stable network. The analysis of *Quality of Service (QoS)* using Wireshark indicates an improvement in network performance, where throughput increased from 654 Kbps to 764 Kbps, delay decreased from 12.93 ms to 10.63 ms, and packet loss remained at 0%. Based on these results, the implementation of bandwidth management using the PCQ method has proven to improve both the fairness of bandwidth distribution and the overall network service quality at SMP Negeri 3 Balung. This enables internet-based activities in the school environment to run more optimally.

Keywords: Bandwidth Management, Per Connection Queue (PCQ)