

ABSTRAK

ANALISIS KINERJA ROUTER X86 BERBASIS OPENWRT DALAM PENGELOLAAN BANDWIDTH DI JARINGAN INTERNET LOKAL (2025:xxx + x halaman + x gambar + x tabel + x lampiran)

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Pengelolaan bandwidth dalam jaringan lokal sangat penting guna menjaga kualitas layanan komunikasi real-time, terutama untuk aplikasi VoIP dan video streaming. Router x86 berbasis OpenWRT merupakan solusi alternatif yang fleksibel dan dapat disesuaikan untuk kebutuhan manajemen trafik. Penelitian ini bertujuan untuk menganalisis kinerja router x86 OpenWRT dalam mengelola bandwidth terhadap trafik VoIP dan streaming, serta mengevaluasi efektivitas Quality of Service (QoS) menggunakan nftables. Pengujian dilakukan pada jaringan lokal dengan sumber internet dari Starlink, menggunakan lima klien aktif dan dua jenis trafik (WhatsApp Call dan YouTube). Parameter yang diuji meliputi throughput, latency, jitter, dan packet loss, baik sebelum maupun sesudah penerapan QoS. Pengambilan data dilakukan menggunakan Wireshark dan uji ping dengan metode eksperimen langsung di lingkungan nyata. Hasil pengujian menunjukkan bahwa setelah konfigurasi QoS diterapkan, terjadi peningkatan performa layanan: jitter menurun lebih dari 50%, delay VoIP stabil di bawah 70 ms, dan tidak ditemukan packet loss. QoS berbasis nftables terbukti efektif dalam memprioritaskan trafik real-time dan meningkatkan kualitas layanan jaringan tanpa memerlukan perangkat tambahan.

Kata kunci: OpenWRT, Router x86, QoS, nftables, VoIP, Streaming, Bandwidth.

ABSTRACT

ANALYSIS OF BANDWIDTH PERFORMANCE ON X86 ROUTER WITH OPENWRT IN BANDWIDTH MANAGEMENT FOR VOIP AND VIDEO STREAMING TRAFFIC IN LOCAL INTERNET NETWORKS

(2025:xxx + x pages+ x picture + x tables + x Attachment)

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The increasing demand for real-time internet services, especially VoIP and video streaming, requires optimal bandwidth management to maintain service quality. This study aims to analyze the performance of bandwidth on an x86 router using OpenWRT firmware in managing local internet traffic. The research focuses on four main parameters based on TIPHON standards: throughput, latency, jitter, and packet loss. The method involves two phases of testing: before and after implementing Quality of Service (QoS) using nftables on OpenWRT. VoIP traffic is simulated using WhatsApp Calls, while video streaming is observed via YouTube. Performance metrics are measured using iPerf, Wireshark, and command line analysis to compare results between the baseline (without QoS) and after QoS configuration. The results indicate that before QoS, VoIP and streaming services suffered from high delay, fluctuating throughput, and significant jitter, causing voice desynchronization and video buffering. After applying nftables-based QoS with proper traffic prioritization and shaping, throughput increased up to 25%, jitter was reduced below 10 ms, and delay decreased significantly to meet real-time service standards. These improvements demonstrate the effectiveness of OpenWRT's traffic control in enhancing the quality of VoIP and video streaming on local x86-based networks.

Keywords: *OpenWRT, QoS, nftables, VoIP, video streaming, x86 router, bandwidth performance*