

Performance evaluation of some video transmission protocols in remote monitoring station systems

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Abstract: This study evaluates the performance of several video transmission protocols within remote monitoring station systems, focusing on their suitability for constrained and often unreliable network environments. Specifically, the research compares Real-Time Streaming Protocol (RTSP), Real-Time Transport Protocol (RTP), and HTTP-based adaptive streaming (HLS/DASH) under varying conditions of bandwidth, packet loss, and latency. Through a series of controlled experiments using a simulated remote station setup, key performance metrics including throughput, end-to-end delay, jitter, and video quality (PSNR/SSIM) were measured. The results indicate that while RTSP/RTP offers the lowest latency, it is highly susceptible to packet loss, leading to significant quality degradation. Conversely, HTTP-based adaptive protocols demonstrate superior resilience to network fluctuations by dynamically adjusting bitrate, albeit at the cost of higher initial buffering delay. The findings provide a comparative framework for selecting an optimal transmission protocol based on specific operational requirements, such as real-time surveillance versus high-fidelity archival recording, offering practical guidance for the design of robust remote monitoring infrastructures.

Keywords: Performance evaluation, video transmission protocols, remote monitoring station, system performance