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On air: Evaluating streaming MPEG4 video performance over wireless networks

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There is not a clear consensus on how open-standard video streaming technologies perform across wireless computer networks. Wireless networking technologies have become nearly ubiquitous, particularly in residential networks, but consumers may not realize that the performance of wireless networks may differ significantly from that of wired networks. Advances in video compression and wireless network bandwidth may allow for the ability to stream higher-quality video content than previously possible. We seek to evaluate how video content, encoded by the MPEG4 codec, performs when streamed across simulated residential wired and wireless networks. We are interested in how the transmission of the video across the network link affects the subjective and objective appearance of the video on the client computer. Our network testbed comprises nine typical desktop computers equipped with a modified version of Videolan Client to playback a network video stream, provided by a server running the Darwin Streaming Server from Apple Inc., connected using wired Ethernet connections and 802.11b, 802.11g, and draft 802.11n version 1.0 wireless connections. Each client was monitored while receiving a sample of raw video data encoded at one of several common bitrates to note any lost content. Each client saved a copy of the video locally for later comparison with the original using the PSNR (Peak Signal to Noise Ratio) and SSIM (Structural SIMilarity) metrics. Looking strictly at established wireless standards (802.11b and g), we found that they are not capable of streaming multiple ITU-R BT.709 high definition video streams across a wireless network link. Wired and draft 802.11n wireless connections did prove robust enough to handle multiple high definition video streams concurrently. Hopefully, our work will lead to a better understanding of the technical issues, performance, and trade-offs in home networking, thus facilitating the rapid deployment of advanced home networking services and applications.