

Simulating and measuring latency in Interactive Remote Rendering systems

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Interactive Remote Rendering (IRR) systems aim to facilitate the exploitation and manipulation of data, large or small, on any device regardless of its available processing or storage capacity. In these systems, computationally intensive rendering tasks are offloaded to powerful remote servers which deliver results (images) back to the client device and therefore protect potentially sensitive and/or copyrighted material from exposure to unknown and untrusted recipients. Many other benefits such as reduced battery usage, being platform agnostic and wider audience reach, exist. Despite these advantages, IRR systems are not widely adopted because the introduction of a network between interactions performed on a device and the remote rendering server results in significant and often unacceptable response delays, known as Interaction Latency (IL). The ability to measure such delays are crucial to the successful mass adaptation of these systems. Unfortunately, very little literature exists on measurement methodologies and performing IL measurements typically requires source code level access, which has the undesired consequence of impacting the operation of the system, even if in a small way. The measuring process is further complicated by the introduced network, which eliminates any control over latency one may have.

In this research, we present an IRR simulator platform which allows for tunable latency parameters and is validated against a real-world network. The simulator was used to develop a novel software tool which aims to measure IL without impacting the system and to do so without a need for access to source code. The proposed tool is shown to provide comparable results to IL measurements taken from a modified IRR system, tested over both a simulated network using our platform, and a real-world IRR system over the internet. We hope that these two contributions will help IRR system developers to better measure IL, and importantly, to also aid in the development of latency management and masking techniques.