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### SPDY vs HTTP/1.1: An Empirical Evaluation of Network Protocol Performance

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# SPDY? Not So Fast!

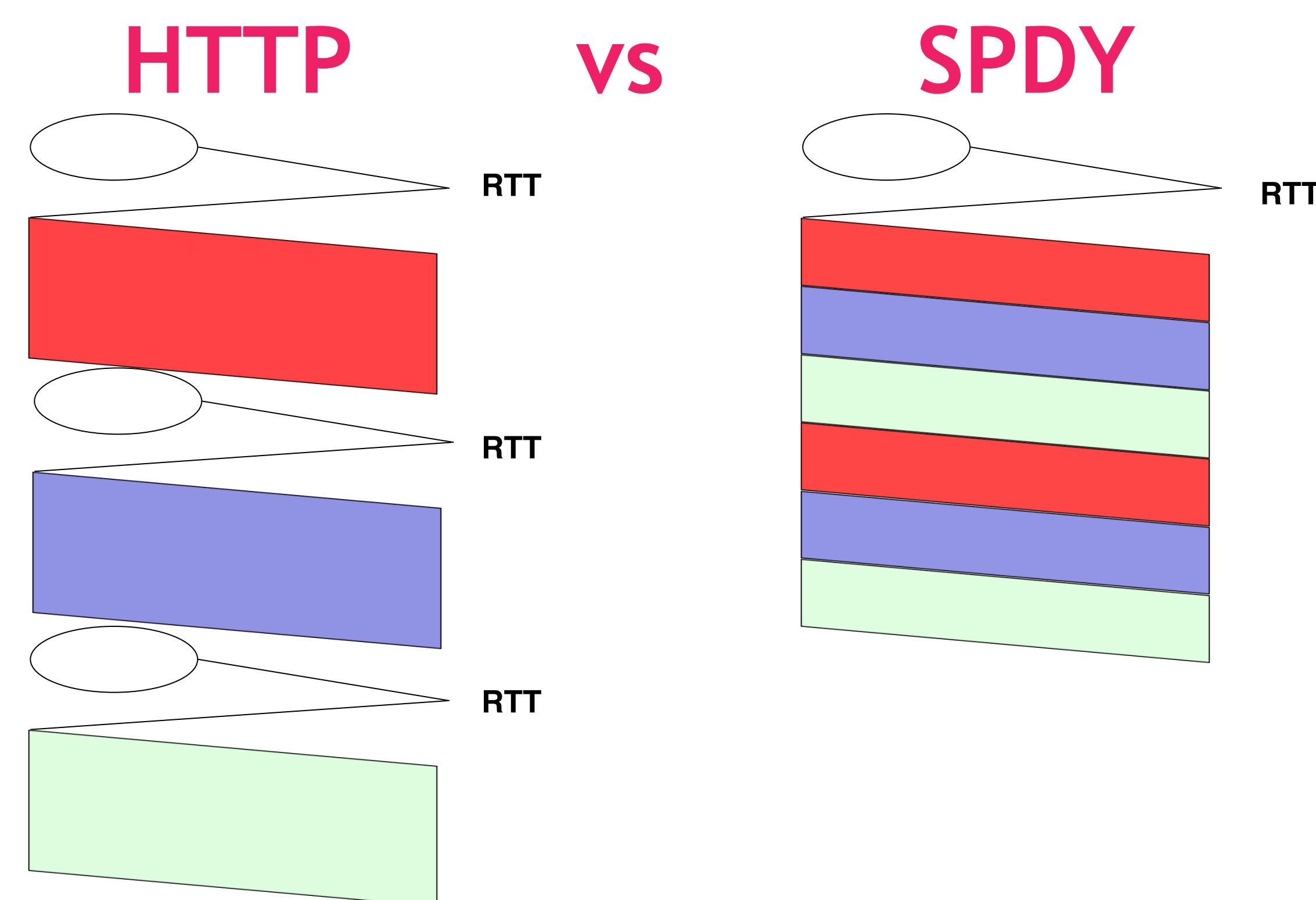
Author: Stephen Chambers  
 Advisor: Radim Bartos  
 Department: Computer Science

## Background

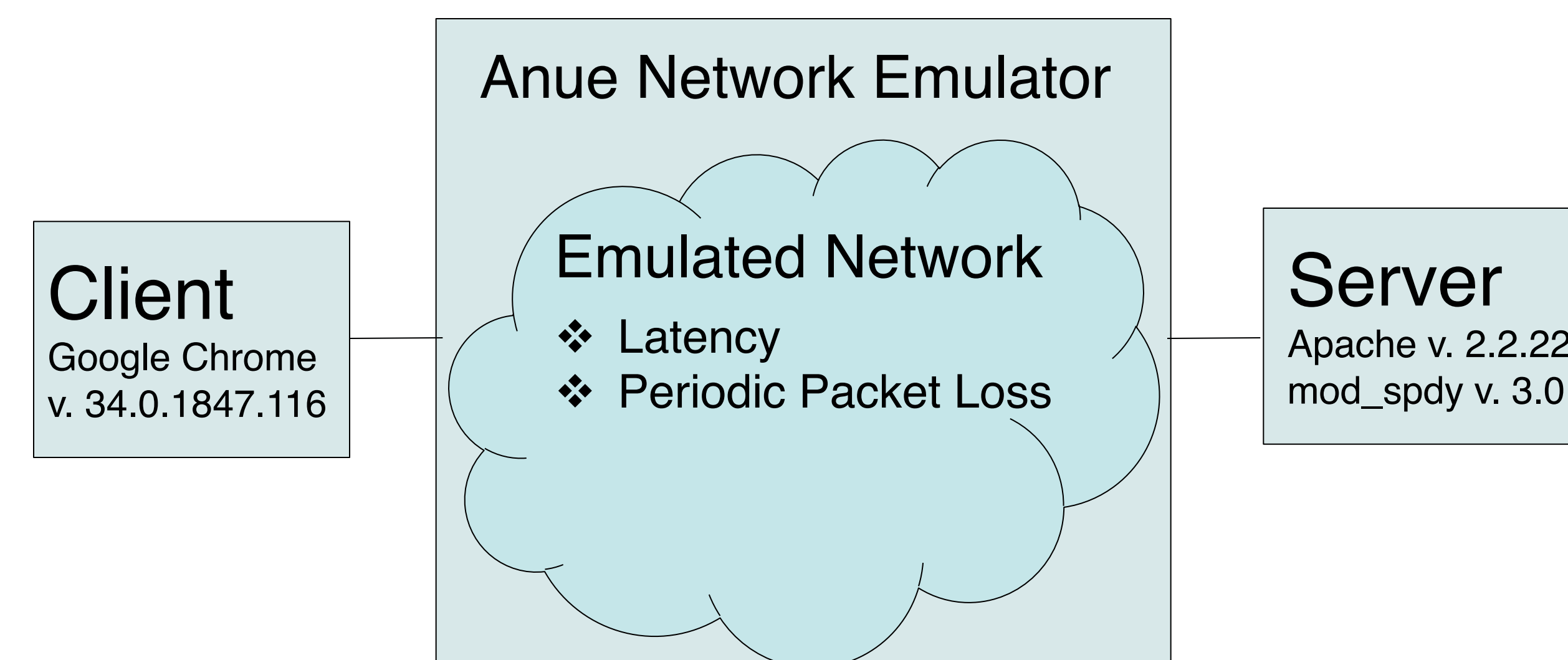
- ❖ As the Internet evolves, the **reduction of page load time** has an increased importance.
- ❖ The application layer should be changed to avoid altering existing implementations.
- ❖ SPDY is a Google proprietary protocol that is deployed in the production environment already on websites such as Google, Facebook, and Twitter.
- ❖ SPDY is the working base for HTTP/2.0.

## Why change?

HTTP	SPDY
<ul style="list-style-type: none"> <li>❖ HTTP uses multiple connections because it can only process requests in a FIFO queue.</li> <li>❖ Only the client can initiate a request.</li> </ul>	<ul style="list-style-type: none"> <li>❖ Multiplexing over a single connection.</li> <li>❖ Server push/Server hint: Server can either suggest a resource to request or push the request to the client unsolicited.</li> </ul>
<ul style="list-style-type: none"> <li>❖ Sends static header data throughout connection.</li> </ul>	<ul style="list-style-type: none"> <li>❖ Removes static information, such as the User-Agent and Host headers.</li> </ul>
<ul style="list-style-type: none"> <li>❖ Optional compression encodings for data.</li> </ul>	<ul style="list-style-type: none"> <li>❖ Forces header compression.</li> </ul>

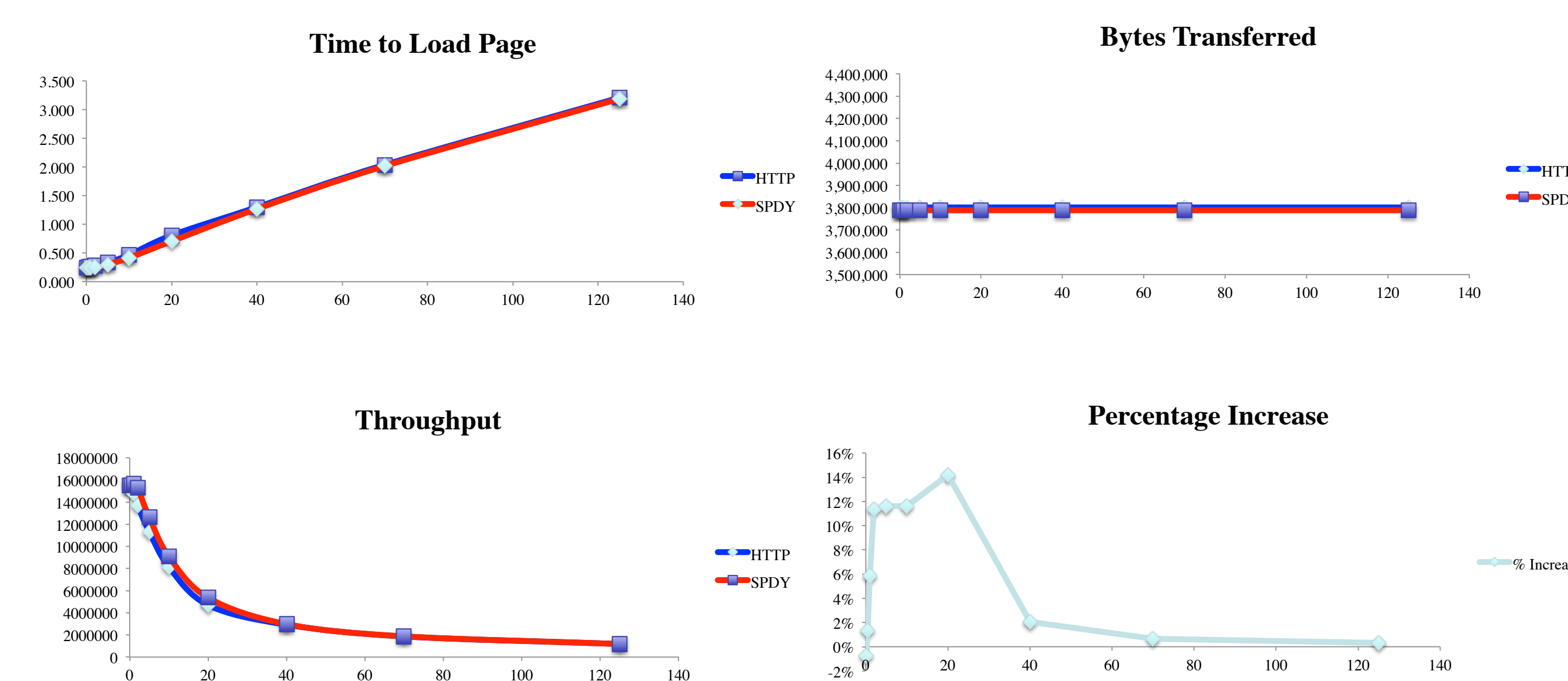


## Experimental Setup

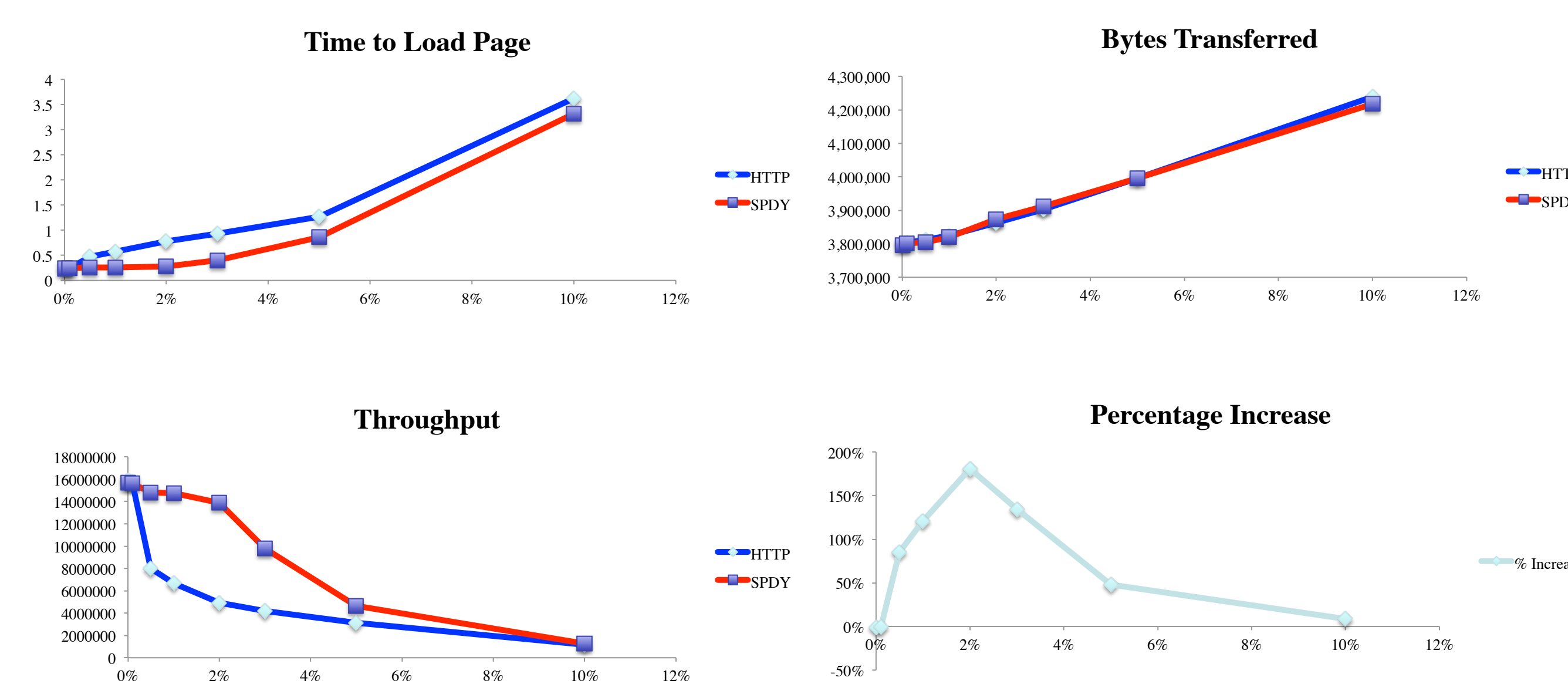


- ❖ Client requested a web page with 100 small image files totaling ~ 3.4MB.
- ❖ PHP script used to generate distinct pages in order to avoid content caching.
- ❖ Presented results are averages of 5 runs.

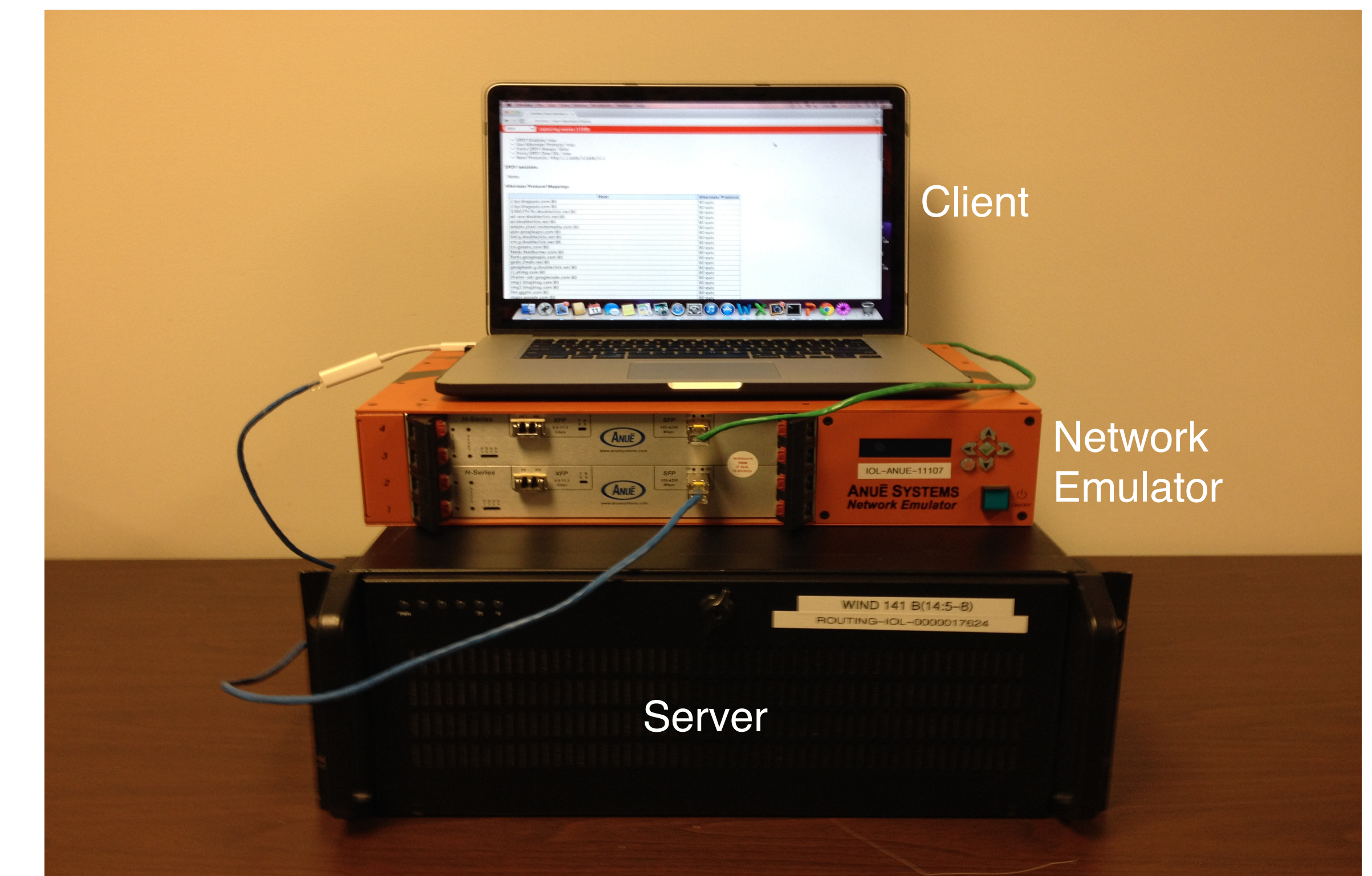
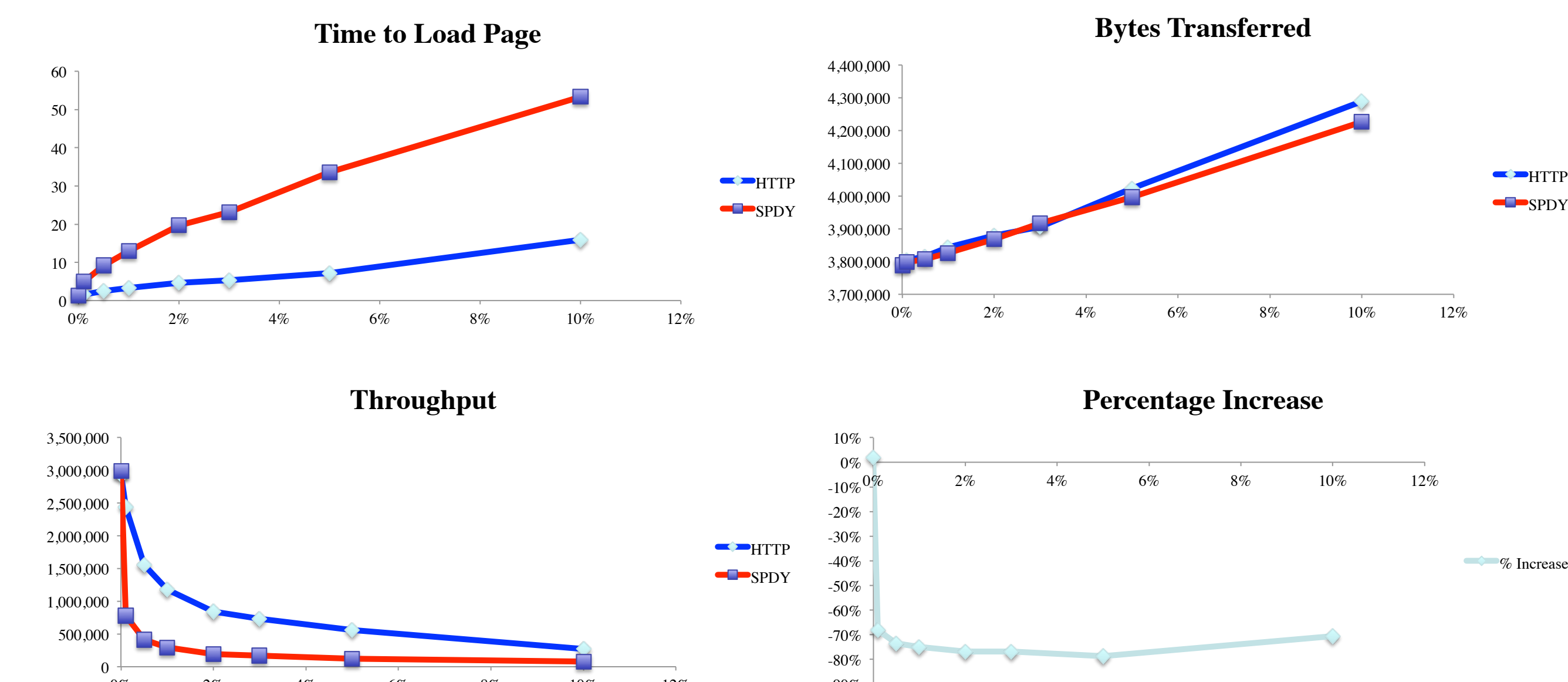
### High Latency, Zero Packet Loss



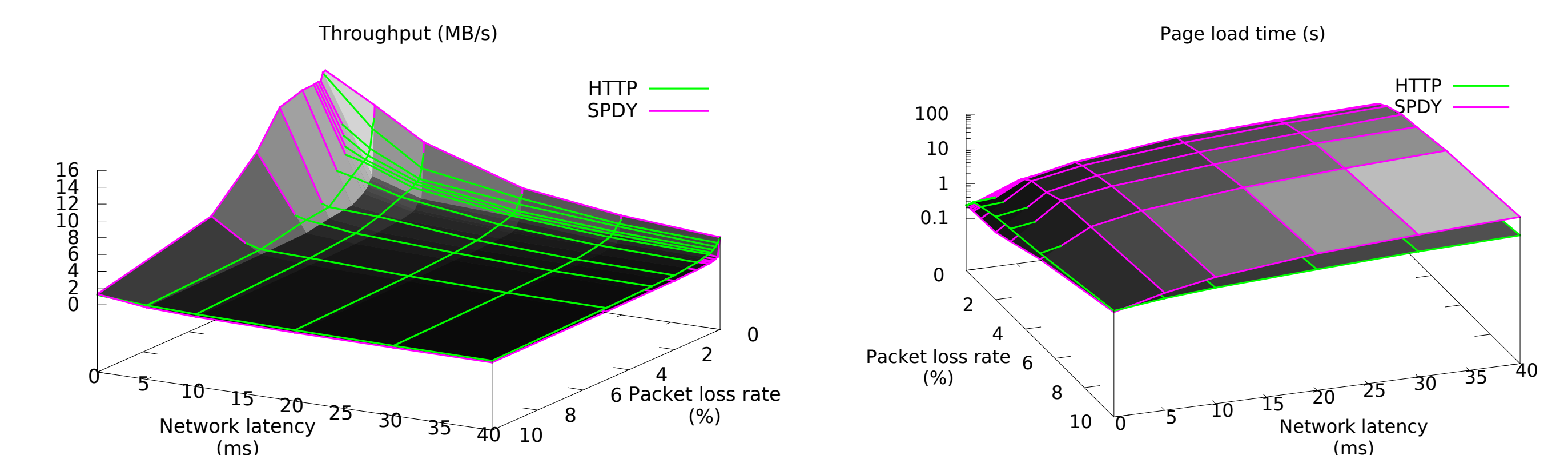
### High Latency, Zero Packet Loss



### High Latency, High Packet Loss



## Throughput and Page Load Time



## Analysis

- ❖ In a high latency network with zero packet loss, SPDY outperforms HTTP in terms of throughput as it takes advantage of SPDY's multiplexing.
- ❖ In a high packet loss network with near zero latency, SPDY outperforms HTTP. Very small latency masks packet loss problems, so SPDY can recover very quickly.
- ❖ In a bad network with **high packet loss and high latency**, **HTTP outperforms SPDY**. HTTP can perform load balancing with its multiple connections.

## Next Steps

Experiments are far from exhaustive. Different application types should be tested against; video files and dynamic content would take advantage of SPDY's Server Push and Server Hint features.