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Performance Metrics for Web Browsing
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Abstract

This document specifies metrics to evaluate performance for web browsing service.

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1. Introduction

Web browsing has become a fundamental service in today's internet. With its massive users, web browsing service has contributed a large proportion of the total network traffic. Understanding how network performance influences web browsing experience benefits both network and content providers, and measurements like web page loading test are frequently conducted in practice. However, there is currently no standard metric to measure such performance. This document intends to add metrics for web browsing to the set of IP Performance Metrics (IPPM).

2. Metrics

This section gives description of a list of metrics that are used to evaluate web browsing related performance.

2.1. Host Connection Delay

Host Connect Delay is the time required to create a TCP connection to the web server. If a secure HTTPS connection is being used this time includes the SSL handshake process. The value of a Host Connection Delay is either a real number, or an undefined (informally, infinite) number of seconds. Note that Keep-Alive connections are often used to avoid the overhead of repeatedly connecting to the web server, so this delay is not always necessarily before loading every element.

2.2. Element Request Delay

Element Request Delay indicates the time required to send the HTTP request message to the server. The value of an Element Request Delay is either a real number, or an undefined (informally, infinite)

number of seconds. An Element Request Delay for an element from a web client is the time from the point when the client starts to send the HTTP request message for the element to the point when the client finishes sending the HTTP request message. This time will depend on the amount of data that is sent to the server. For example, long Send times will result from uploading files using an HTTP POST method.

2.3. Element Waiting Delay

Element Waiting Delay indicates the idle time spent waiting for a response message from the server. The value of an Element Waiting Delay is either a real number, or an undefined (informally, infinite) number of seconds. An Element Waiting Delay for an element from a web client is the time from the point when the client finishes sending the HTTP request message to the point when the client receives the first byte of the HTTP response message. This value will depend on the delays introduced due to network latency and the time required to process the request on the web server.

2.4. Element Receiving Delay

Element Receiving Delay indicates the time taken to read the HTTP response message from the web server. The value of an Element Receiving Delay is either a real number, or an undefined (informally, infinite) number of seconds. An Element Receiving Delay for an element from a web client is the time from the point when the client receives the first byte of the HTTP response message for the element to the point when the client finishes receiving the HTTP response message. This value will depend on the size of the content returned and network bandwidth.

2.5. Element Loading Success

Element Loading Success indicates the result of the HTTP transaction with the web server to download a web page element. The value of an Element Loading Success is either a one (signifying successful loading of the element) or a zero (signifying unsuccessful loading of the element). An Element Loading Success for an element from a web client is 1 exactly when the Element Request Delay, Element Waiting Delay and Element Receiving Delay are all a finite value; An Element Loading Success for an element from a web client is 0 exactly when any of the Element Request Delay, Element Waiting Delay and Element Receiving Delay is undefined.

2.6. Web Page TTFB (Time To First Byte)

Web Page TTFB indicates the duration needed to receive the first byte from the web server when loading a web page. The value of a Web Page TTFB is either a real number, or an undefined (informally, infinite) number of seconds. A Web Page TTFB for a web page from a web client is the time from the point when the client starts to send the first HTTP request message to the point when the client receives the first byte of the first HTTP response message.

2.7. Web Page Loading Time

Web Page Loading Time indicates the duration needed to receive all the elements from the web server when loading a web page. The value of a Web Page Loading Time is either a real number, or an undefined (informally, infinite) number of seconds. A Web Page Loading Time for a web page from a web client is the time from the point when the client starts to send the first HTTP request message to the point when the client finishes receiving the last HTTP response message.

3. Security Considerations

TBD.

4. IANA Considerations

The document makes no request for IANA action at this time.

5. Normative References

- [RFC2330] Paxson, V., Almes, G., and J. Mahdavi, "Framework for IP Performance Metrics", RFC 2330, May 1998.
- [RFC2616] Fielding, R., Gettys, J., and J. Mogul, "Hypertext Transfer Protocol -- HTTP/1.1", RFC 2616, June 1999.

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