                   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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