Fetching multiple objects

Let a browser need to fetch 10 small objects (0.5 KB each) from a Web server using HTTP request/response in order to render a Web page. Given that the RTT is 100 ms and bandwidth is 1 Gbps, how much time does it take to fetch the objects using TCP (with initial handshake) when:

a) Objects are fetched one at a time?

b) 5 parallel TCP connections can be used? A connection is closed immediately after the corresponding object is received.

c) Using a single persistent TCP connection to the server, still fetching objects one after the other?

d) Pipelining requests? All requests can be sent using a single persistent TCP connection immediately one after the other.

Initial TCP window size is 10 MSS where 1 MSS = 1.5KB.

Reducing network RTTs

Reducing network RTTs can reduce Web page load times and enable Internet-based applications with strict latency requirements. Let us assume that the geodesic distance between New York and Chicago is 1000 Kms. The fiber cable laid between the 2 locations takes a circuitous route with an inflation of 2x over the geodesic distance. Also, the speed of light in fiber is 2/3rd the speed of light in air (~300,000 Kms/sec). What is the RTT on fiber cables between the 2 locations. If we lay microwave (MW) towers along the geodesic distance which use line-of-sight radio waves for communication (speed almost same as the speed of light in air), what is the minimum RTT we can achieve? Assume 0 switching delay.
QUIC: 0-RTT

How does a QUIC client and server interact to achieve 0-RTT handshakes using tokens? What happens when the token expires? You can draw timeline diagrams and messages passed between the client and the server to explain your answer.

QUIC: Stream multiplexing

Explain how head-of-line blocking might occur while using HTTP/2 on top of TCP. How does QUIC mitigate this issue?

We are happy to give individual feedback in person on request.