

The QUIC Transport Protocol: Design and Internet-Scale Deployment

Abhinav Kumar (abkuma)

Quic (Quick UDP Internet Connections) is a new transport design by google to improve the performance of HTTPS traffic. Quick uses low-latency transportation protocol often used for apps and services that require speedy online service. QUIC uses a cryptographic handshake that minimizes handshake latency for most connections by using known server credentials connections and by removing redundant handshake-overhead multiple layers in the network stack. It is a single monolithic protocol.

Quic is designed achieve several goals like deployability, security, and reduction in the handshake and head of line blocking delays. First, it helps to reduce the connection times. Unlike TCP which involves 4 round-trip requests involved QUIC makes the connection faster by using a single handshake only. Secondly, Quic performs better when data are lost. Under TCP if one data packet is lost, the recipient must wait for it to be received causing a huge impact on connection performance. The Quic solves this by allowing the stream of data independently. Each QUIC packet carries a new packet number, including those carrying retransmitted data. It removes the need to distinguish the ACK of a retransmitted packet. So, they no longer need to wait for the missing data packet to be repaired.

Another important feature is the stable connections when the networks are changed. Quic gives each connection a unique identifier that is connected to a web server. These can easily be reestablished by sending a packet rather than creating a new connection even there is a change in the IP. Also, it is much easier to improve and develop since it is implemented on the application layer thus making it an easier and more flexible protocol. For the proper flow control, QUIC uses credit-based control. Under this receiver periodically send a window update frame based on which they can increase the offset limit for that stream thus allowing to send more data. Furthermore, QUIC uses the variant of multi-TCP for Cubic during the congestion avoidance.

Still, there are few areas where QUIC is trying to make some improvement. But the amount of improvement it brings as compared to the TCP is worth accepting. Now the google is slowly using QUIC in most of its internet traffic. In the coming future, QUIC will create a great impact on the way internet traffic is governed.

