

CSN-361 (Computer Networks Lab)

Project Proposal by Group 16
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Overview of QUIC

QUIC (Quick UDP Internet Connections) is a modern transport protocol first proposed by Google in 2012 and in 2021, the IETF officially published QUIC as RFC 9000. QUIC was motivated in large part by the challenges of matching the **request/response semantics of HTTP to the stream-oriented nature of TCP**. These issues have become more noticeable over time, due to factors such as the rise of high-latency wireless networks, the availability of multiple networks for a single device (e.g., Wi-Fi and cellular), and the increasing use of encrypted, authenticated connections on the Web. QUIC implements fast connection establishment with encryption and authentication in the first RTT. It provides a connection identifier that persists across changes in the underlying network. It supports the multiplexing of several streams onto a single transport connection, to avoid the head-of-line blocking that may arise when a single packet is dropped while other useful data continues to arrive. And it preserves (and in some ways improves on) the congestion avoidance properties of TCP.

Key Features (To Be Implemented)

- **Faster Connection Establishment (0-1 RTT)**
- **Reliable and Unreliable Delivery**
- **Congestion Control and Flow Control**
- **Integrated Security**
- **Stream Multiplexing***
- **Migration and Mobility [Connection Migration]***

* Optional features to be implemented if time permits

Motivation

QUIC is a most interesting development in the world of transport protocols. Many of the limitations of TCP have been known for decades, but QUIC represents one of the most successful efforts to date to stake out a different point in the design space. Because QUIC was inspired by experience with HTTP and the Web—which arose long after TCP was well established in the Internet—it presents a fascinating case study in the unforeseen consequences of layered designs and in the evolution of the Internet.

Main Goal is **Learning**

- Have a very strong understanding of many advance concepts of Transport Layer Service Model

- Connection Establishment
 - Flow and Congestion Control
 - Security and Encryption
 - Stream-Multiplexing
 - (New) Connection Migration
- Grasping QUIC's design objectives and the reasoning behind its architecture (Basically understanding **WHY** it was designed the way it is.)