

Background

The protocol is the heart of the definition of one layer of the computer network. The protocol defines the messages and the order in which they must be transferred. It is the basic building block of the network; it helps solve a specific problem by defining a piece of the overall system. For this course we will be examining the QUIC (RFC 9000) protocol for several reasons. Specifically, it is being used to implement HTTP/3, but more importantly, it has the promise to become a replacement transport for TCP (RFC 675) that was published in December 1974 (~50 years ago)

Objective

The objective of this assignment is to examine the QUIC protocol and understand the service that it provides. While QUIC is an interesting and modern protocol, at the end of this exercise, you should be able to break down any networking protocol into its major parts and understand how and why it works. Specifically, around balancing functionality and tradeoffs that the designers made during the creation of the protocol. This analysis should help you build the foundation to design and build your own protocol as we go through the course. THE GOAL HERE IS TO LEARN THE PROCESS OF ANALYZING A PROTOCOL, NOT JUST COPY OTHERS ANALYSIS.

Directions

You should analyze the protocol by considering the following in your analysis.

- Take a shot at identifying why this protocol is needed, what is it attempting to address or what problem is it attempting to solve
- Clearly identify the service that this protocol provides. Illustrate this service by how it is used in the context of the OSI or TCP reference models.
- Analyze the common themes of the protocol – ensure that you’ve identified the following pieces of the protocol and how they work – also – could this theme be treated better? Is the protocol doing it well (in subjective analysis)?
 - PDU (Layout and Delimiters) – there may be more than one.
 - Addressing
 - Flow Control
 - Error Control
 - Quality Of Service
- Comment on the security of the protocol (Authentication, Encryption, and Trust).
- Provide the DFA for the protocol. Highlight a few important stateful aspects of QUIC

- Discuss how the protocol is extensible. How can new functionality be added? You may have to look at related RFCs (RFCs of the protocol other than the initial one – there are many for QUIC) to get this information.
- Include a subjective analysis of the protocol – do you think the protocol is well designed or not? You must backup your analysis with details – justify your opinion and show some of the reasons. What parts of the protocol come out as “good”, “bad”, “weird” or “it probably made sense at one time”?

Ensure that you reference any information that you use, you must use one or more RFCs for this part of the project. You may complement your work with other references on QUIC as there are many free resources online (medium articles, technical articles, YouTube videos, etc).

All submissions should be made through Drexel Learn

Paper Format

A suggested organization for this deliverable is:

Section 1 – Introduction and Service Description

Section 2 – PDU Analysis and Common Themes

Section 3 – Security issues Section

Section 4 – DFA

Section 5 – Extensibility

Section 6 – Subjective Analysis

Submission will be via blackboard, in either PDF or MS Word Format. Make sure your name and student ID is somewhere in the document.

Grading Rubric

Definition of service: 20 points

PDU analysis and common themes: 20 points

Security issues: 10 points

DFA and description: 15 points

Extensibility: 10 points

Subjective Analysis: 20 points

Look/references: 5 points

Total: 100 points