

# Abstract

QUIC and HTTP/3, the latest standards in network protocol technologies, stand to revolutionise how web-based services communicate. Container orchestration tools such as Kubernetes predominantly rely on the HTTP/2 protocol layered over TCP for internal communication between services. This method of communication, while effective, poses limitations in modern environments. The shift from the traditional HTTP/2 over TCP to HTTP/3 is imperative. HTTP/3, with QUIC, offers improved performance, security, and reliability by fundamentally changing how data is transmitted over the internet. This advancement necessitates a change in the internal communication strategies of Kubernetes, as the orchestration of containerised services needs to accommodate the enhanced capabilities of QUIC; namely its multiplexing and connection migration features. Despite Kubernetes' wide adoption as a microservices orchestrator, its native support for HTTP/3 is limited, reflecting a significant gap in its networking stack. As well as this, growing demand for efficient management of diverse data streams, which are part of multiplexed connections like QUIC, within microservices, presents a critical challenge for developers and network engineers. To address these challenges, this project proposes a solution by integrating "ANGIE", a modified ingress controller based on NGINX, to support HTTP/3 traffic within a Kubernetes cluster. By leveraging ANGIE, the system can harness the full spectrum of HTTP/3 features, facilitating a smoother and more efficient ingress routing process. This in turn enables efficient routing of streams within a HTTP/3 connection, by using HTTP headers to determine the content type of each stream. This approach not only showcases the potential of HTTP/3 in optimising network communications within Kubernetes but also underscores the significant benefits QUIC streams bring to the table. Through the proposed implementation, Kubernetes can effectively manage multiplexed HTTP/3 connections.