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# QUIC Multiplexing
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Abstract

If QUIC is to be used for peer-to-peer data transport with NAT traversal, then it is necessary to be able to demultiplex QUIC and other protocols used in WebRTC on a single UDP port. This memo discusses a proposed scheme for demultiplexing.

Status of This Memo

This Internet-Draft is submitted in full conformance with the provisions of BCP 78 and BCP 79.

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## 1. Introduction

QUIC [I-D.ietf-quic-transport] is a new network transport protocol. While it is initially intended as a replacement for TCP in order to better support HTTP/2 [RFC7540], with the introduction of datagram support [I-D.pauly-quic-datagram] it will also support unreliable as well as reliable transport. HTTP is an asymmetric client-server protocol, but other uses of QUIC support peer-to-peer operation and so will need effective NAT traversal using ICE [RFC5245], which which makes use of STUN [RFC5389] and TURN [RFC5766] to discover NAT bindings. Therefore for QUIC to be utilized for peer-to-peer data transport, QUIC and STUN must be able to multiplex on the same port.

In a WebRTC scenario where RTP is used to transport audio and video and QUIC is used for data exchange, SRTP [RFC3711] is keyed using DTLS-SRTP [RFC5764] and therefore SRTP/SRTCP [RFC3550], STUN, TURN, DTLS [RFC6347] and QUIC will need to be multiplexed on the same port.

Within the W3C, a Javascript API for the use of QUIC for peer-to-peer data exchange [WEBRTC-QUIC] is under development within the ORTC Community Group, and an Origin Trial [WEBRTC-QUIC-TRIAL] implementing

an early version of this API shipped in the Chrome and Edge browsers. Due to lack of demultiplexing support, the Origin Trial could only support peer-to-peer use of QUIC over a standalone ICE transport, as defined in [WEBRTC-ICE].

As noted in [RFC7983] Figure 3, protocol demultiplexing currently relies upon differentiation based on the first octet, as follows:

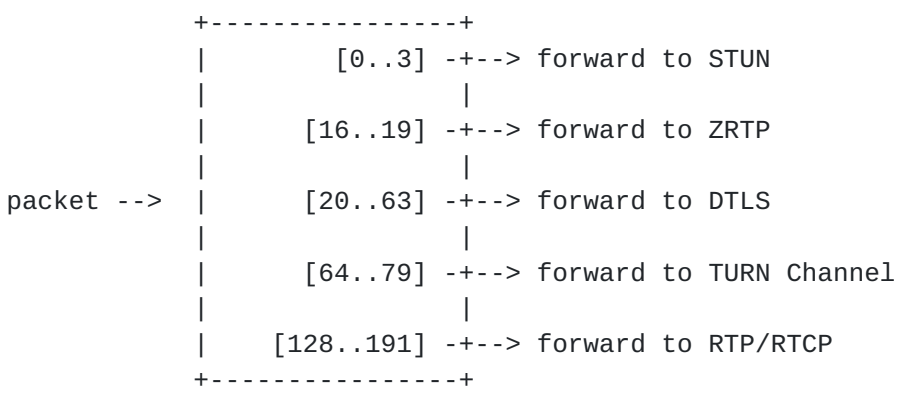



Figure 1: RFC 7983 packet demultiplexing algorithm.

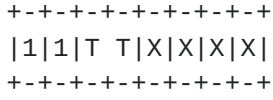
As noted by Colin Perkins and Lars Eggert in [QUIC-Issue][QUIC-MULTI] this created a potential conflict with the design of the QUIC headers described in versions of [I-D.ietf-quic-transport] prior to -08.

## 1.1. Terminology

The key words "MUST", "MUST NOT", "REQUIRED", "SHALL", "SHALL NOT", "SHOULD", "SHOULD NOT", "RECOMMENDED", "MAY", and "OPTIONAL" in this document are to be interpreted as described in [RFC2119].

## 2. Solution

As of draft 18, the QUIC Long Header packet type field defined in [I-D.ietf-quic-transport] Section 17.2 appears as follows:




Where:

T = Long Packet Type (0x0 - 0x3)
X = Type-Specific Bits.

This potentially produces values of the first octet in the ranges 192-255.

The QUIC Short Header packet type field defined in [I-D.ietf-quic-transport] Section 17.3 appears as follows:

```
 +-+-+-+-+-+-+-+-+
 |0|1|S|R|R|K|P P|
 +-+-+-+-+-+-+-+-+
```

Where:

S = Spin Bit
R = Reserved bits
K = Key Phase bit
P = Packet Number Length.

This potentially produces values of the first octet in the ranges 64-127 (assuming that the reserved bits may not always be set to zero).

As a result, the multiplexing scheme supported in -18 operates as follows:

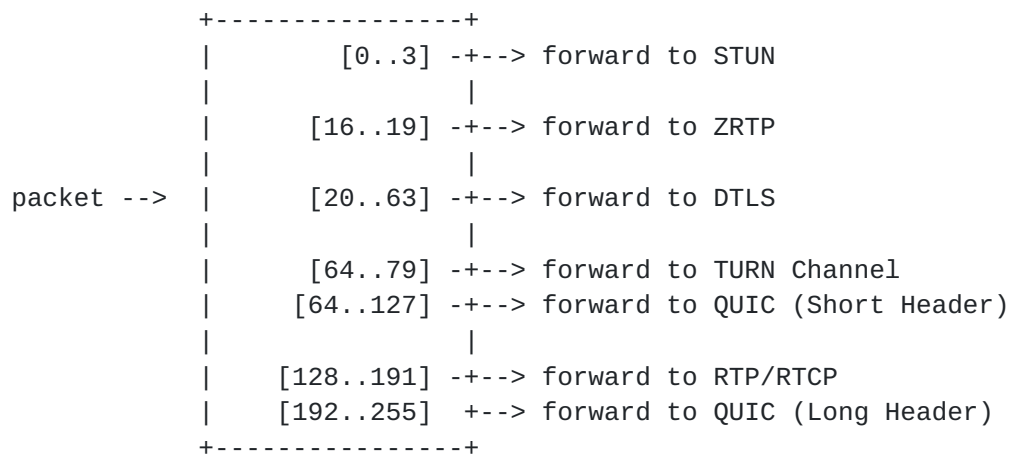



Figure 3: Packet demultiplexing algorithm in Draft 18.

Note that while the above diagram has a potential conflict between packets sent in TURN Channels and the QUIC short header, this conflict is not considered serious for WebRTC where TURN Channels are rarely used.

## 3. Security Considerations

The solution discussed in this document could potentially introduce some additional security considerations beyond those detailed in [RFC7983].

Due to the additional logic required, if mis-implemented, heuristics have the potential to mis-classify packets.

When QUIC is used for only for data exchange, the TLS-within-QUIC exchange [I-D.ietf-quic-tls] derives keys used solely to protect the QUIC data packets. If properly implemented, this should not affect the transport of SRTP nor the derivation of SRTP keys via DTLS-SRTP, but if badly implemented, both transport and key derivation could be adversely impacted.

## 4. IANA Considerations

This document does not require actions by IANA.

## 5. References

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