

**Using QUIC Datagrams with HTTP/3**  
**draft-schinazi-quit-h3-datagram-01**

Abstract

The QUIC DATAGRAM extension provides application protocols running over QUIC with a mechanism to send unreliable data while leveraging the security and congestion-control properties of QUIC. However, QUIC DATAGRAM frames do not provide a means to demultiplex application contexts. This document defines how to use QUIC DATAGRAM frames when the application protocol running over QUIC is HTTP/3 by adding an identifier at the start of the frame payload.

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## [1.](#) Introduction

The QUIC DATAGRAM extension [[I-D.pauly-quic-datagram](#)] provides application protocols running over QUIC [[I-D.ietf-quic-transport](#)] with a mechanism to send unreliable data while leveraging the security and congestion-control properties of QUIC. However, QUIC DATAGRAM frames do not provide a means to demultiplex application contexts. This document defines how to use QUIC DATAGRAM frames when the application protocol running over QUIC is HTTP/3 [[I-D.ietf-quic-http](#)] by adding an identifier at the start of the frame payload.

This design mimics the use of Stream Types in HTTP/3, which provide a demultiplexing identifier at the start of each unidirectional stream.

### [1.1.](#) Conventions and Definitions

The key words "MUST", "MUST NOT", "REQUIRED", "SHALL", "SHALL NOT", "SHOULD", "SHOULD NOT", "RECOMMENDED", "NOT RECOMMENDED", "MAY", and "OPTIONAL" in this document are to be interpreted as described in [BCP 14](#) [[RFC2119](#)] [[RFC8174](#)] when, and only when, they appear in all capitals, as shown here.

## [2.](#) HTTP/3 DATAGRAM Frame Format

When used with HTTP/3, the Datagram Data field of QUIC DATAGRAM frames uses the following format:



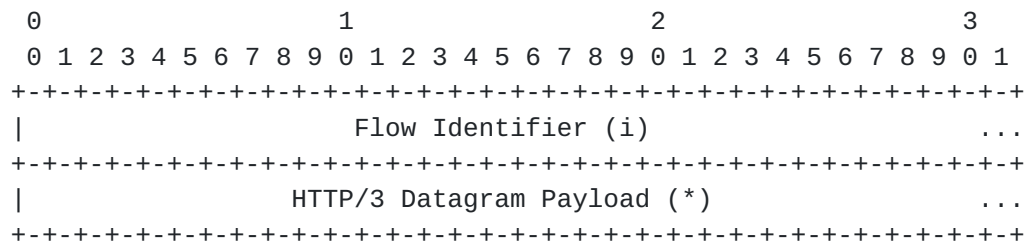


Figure 1: HTTP/3 DATAGRAM Frame Format

**Flow Identifier:** A variable-length integer indicating the Flow Identifier of the datagram (see [Section 2.1](#)).

**HTTP/3 Datagram Payload:** The payload of the datagram, whose semantics are defined by individual applications.

### 2.1. Flow Identifiers

Flow identifiers represent bidirectional flows of datagrams within a single QUIC connection. These are effectively equivalent to UDP ports and allow basic demultiplexing of application data. The primary role of flow identifiers is to provide a standard mechanism for demultiplexing application data flows, which may be destined for different processing threads in the application, akin to UDP sockets.

Beyond this, a sender **SHOULD** ensure that DATAGRAM frames within a single flow are transmitted in order relative to one another. If multiple DATAGRAM frames can be packed into a single QUIC packet, the sender **SHOULD** group them by flow identifier to promote fate-sharing within a specific flow and improve the ability to process batches of datagram messages efficiently on the receiver.

### 3. Flow Identifier Allocation

Implementations of HTTP/3 that support the DATAGRAM extension will provide a flow identifier allocation service. That service will allow applications co-located with HTTP/3 to request a unique flow identifier that they can subsequently use for their own purposes. The HTTP/3 implementation will then parse the flow identifier of incoming DATAGRAM frames and use it to deliver the frame to the appropriate application.

### 4. Security Considerations

This document currently does not have additional security considerations beyond those defined in [\[I-D.ietf-quic-transport\]](#) and [\[I-D.pauly-quic-datagram\]](#).



## 5. IANA Considerations

This document has no IANA actions.

## 6. Normative References

[I-D.ietf-quic-http]

Bishop, M., "Hypertext Transfer Protocol Version 3 (HTTP/3)", [draft-ietf-quic-http-23](#) (work in progress), September 2019.

[I-D.ietf-quic-transport]

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Pauly, T., Kinnear, E., and D. Schinazi, "An Unreliable Datagram Extension to QUIC", [draft-pauly-quic-datagram-03](#) (work in progress), July 2019.

[RFC2119] Bradner, S., "Key words for use in RFCs to Indicate Requirement Levels", [BCP 14](#), [RFC 2119](#), DOI 10.17487/RFC2119, March 1997, <<https://www.rfc-editor.org/info/rfc2119>>.

[RFC8174] Leiba, B., "Ambiguity of Uppercase vs Lowercase in [RFC 2119](#) Key Words", [BCP 14](#), [RFC 8174](#), DOI 10.17487/RFC8174, May 2017, <<https://www.rfc-editor.org/info/rfc8174>>.

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