QUIC-Aware Proxying Using CONNECT-UDP

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Extending CONNECT-UDP

CONNECT-UDP lets you proxy UDP packets in HTTP/3, which implicitly supports QUIC.

Extensions add QUIC-awareness to provide two optional capabilities:

1. Proxy reuse of UDP four-tuples

2. Forwarding of QUIC short header packets between client and proxy, without double encapsulation
CONNECT-UDP

Client A

QUIC over H3 Datagrams

MASQUE Proxy

QUIC over UDP

Client B

HTTP/3 Server
CONNECT-UDP
Shared UDP Tuple

Client A

MASQUE Proxy

Client B

HTTP/3 Server

QUIC over H3 Datagrams

QUIC over UDP
CONNECT-UDP
Forwarded Mode

Client A

MASQUE Proxy

Client B

HTTP/3 Server

QUIC (sh only) over UDP

QUIC over UDP
Client Requests

First request includes Client-Connection-Id

Proxy can reject, which leads the client to select a new Connection ID

Allow “fast-open”, sending DATAGRAM frames with first request

To enable forwarding, client sends a request once it knows the Server-Connection-Id
Proxy State

Proxy maintains state to map Connection IDs and UDP sockets

All mappings are created based on client requests, and can be rejected if conflicting

Both clients and proxies have the option to not forward
Proxy Mappings

Map tunnelled client-to-server packets:

\[
\text{Client} \leftrightarrow \text{Proxy QUIC Connection} + \text{Datagram Flow ID} \rightarrow \text{Server-Facing Socket}
\]

Map forwarded client-to-server packets:

\[
\text{Client-Facing Socket} + \text{Server Connection ID} \rightarrow \text{Server-Facing Socket}
\]
Proxy Mappings

Map tunnelled server-to-client packets:

( Server-Facing Socket + Client Connection ID ) \rightarrow ( Client ↔ Proxy QUIC Connection + Datagram Flow ID )

Map forwarded server-to-client packets:

( Server-Facing Socket + Client Connection ID ) \rightarrow ( Client-Facing Socket )
Connection ID Conflicts

Conflict is detected if all elements on the “left-hand” side of a mapping overlap with another mapping.

Sends 409 (Conflict) status response.

Very short client Connection IDs likely to conflict.

Clients are always aware of proxying, and should choose longer Connection IDs if they want QUIC-aware proxying.
Next steps

Consider merging into CONNECT-UDP

Consider adopting as an extension document

Questions?