



# HTTP/QUIC

draft-ietf-quic-http-02

# Notable Changes From -00 to -02

In -01:

- Requests now have a pair of streams to themselves
  - HPACK uses Sequence
- ALPN and Alt-Svc reworked
- Adopted different SETTINGS format

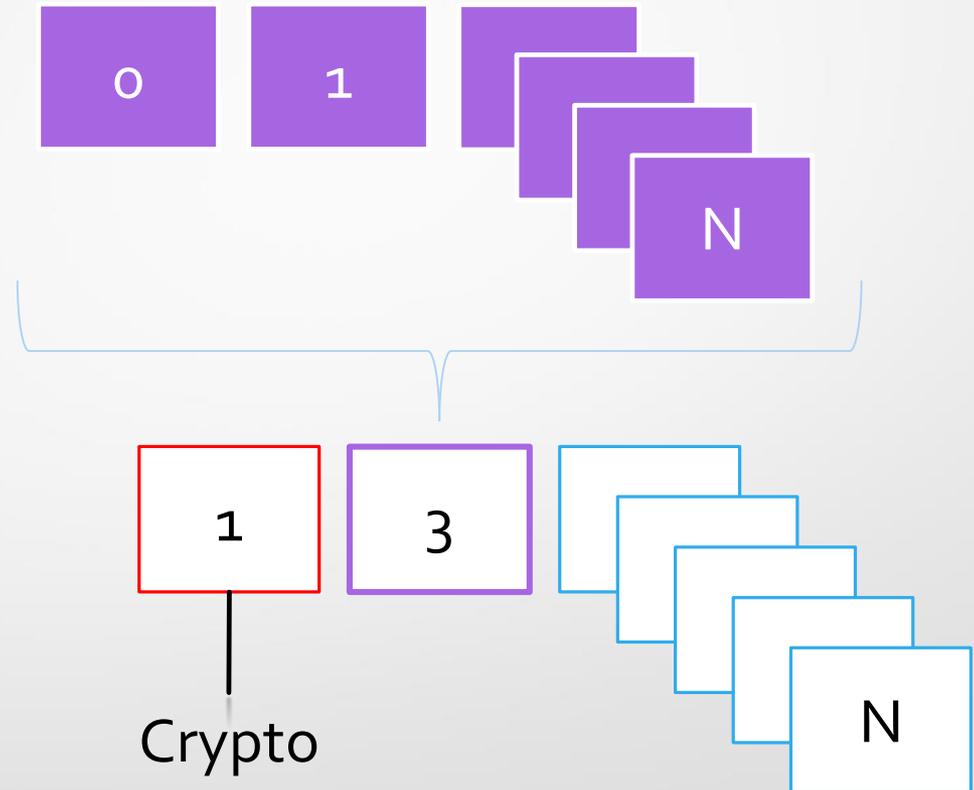
In -02:

- SETTINGS are one-time-only – no changes, no ACKs
- Closing a message control stream is a fatal error
- Guidance about porting HTTP/2 extensions

# -oo Stream Usage

- Stream 1 reserved for crypto
- Stream 3 reserved for abridged HTTP/2 session
  - Reflects migration path from TCP to QUIC
  - Functionality added to QUIC is removed from HTTP/2
    - PING
    - GOAWAY
    - Flow Control

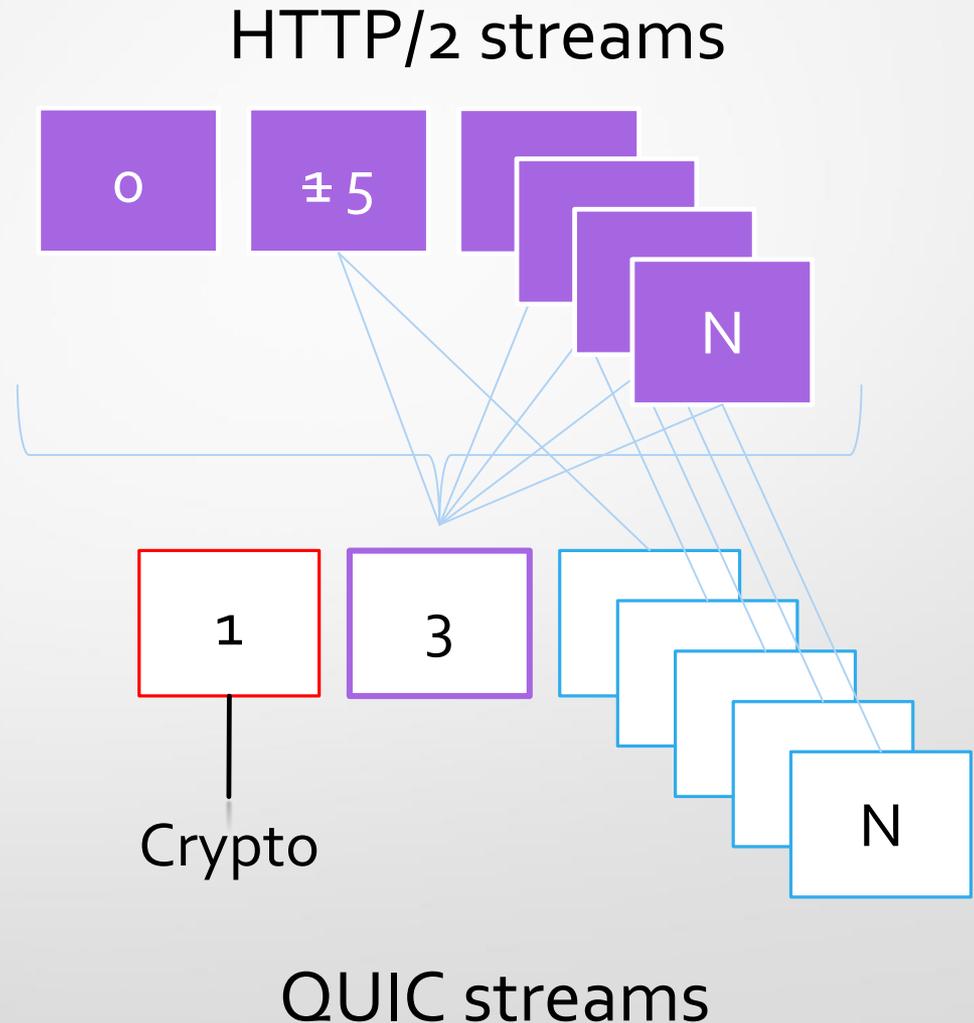
## HTTP/2 streams



## QUIC streams

# -oo Stream Usage

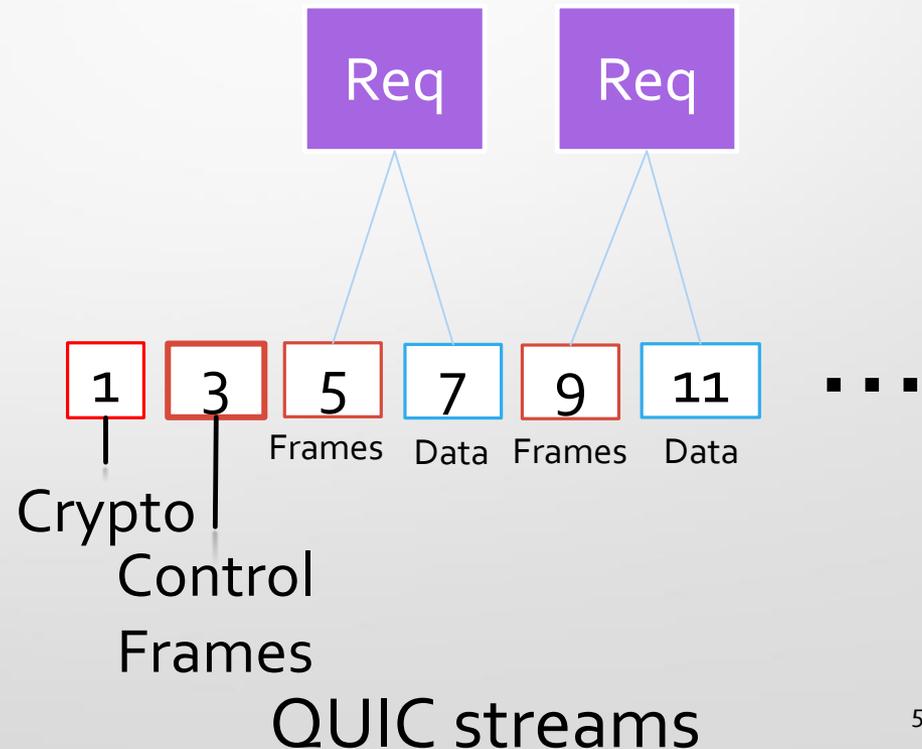
- Stream 1 reserved for crypto
- Stream 3 reserved for abridged HTTP/2 session
- HTTP/2 streams straddle QUIC Stream 3 *and* another QUIC stream
  - H2 Stream 0 is only on QUIC Stream 3
  - Other QUIC streams replace DATA frames
  - All other frames (HPACK) on QUIC Stream 3



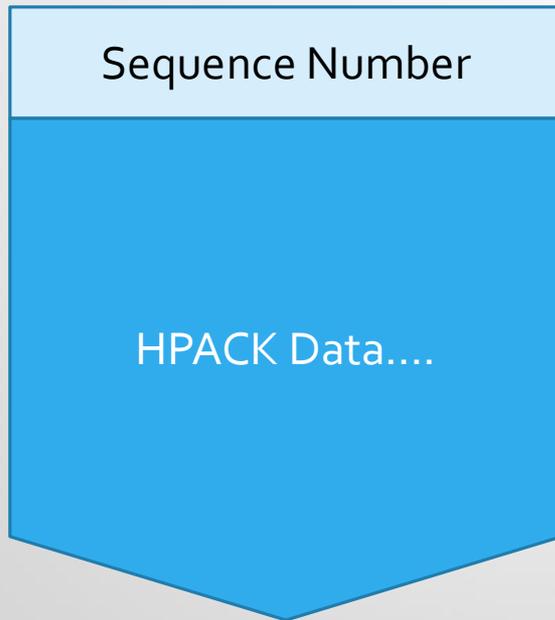
# -01/-02 Stream Usage

## HTTP requests

- Stream 3 – Connection Control Stream
  - Carries session-wide info (SETTINGS, PRIORITY)
- Each request occupies two streams
  - Message control stream – HEADERS, etc.
  - Unframed data stream carries message payload
- No muxing in HTTP-layer framing, but still uses frames



# Shoehorning HPACK



- HTTP/QUIC -02 still uses HPACK
- Adds a counter on HPACK frames
  - Requires decoder process frames in encode-order
- No *more* HOLB than before, but no less
- Can't reset message control streams
- Alternatively, QPACK proposals:
  - [draft-bishop-quick-http-and-qpack](#)
  - [draft-krasic-quick-hpack](#)

# Connection Negotiation

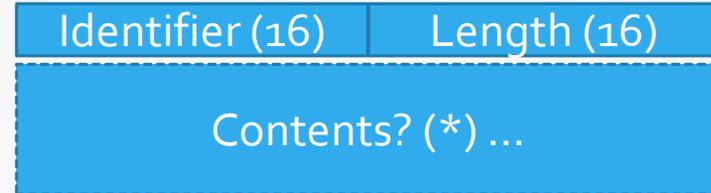
- Needed an ALPN token; was “quic”
  - Defined hq for RFC
  - Defined hq-xx for drafts (e.g. hq-01)
- HTTP/QUIC support still detected by use of Alt-Svc
- Alt-Svc “quic” parameter as version negotiation hint
  - Format of version changed
    - Was given as list of numbers; implied prefix of ASCII Q plus three-digit number in ASCII
      - 37 magically understood as version “Q037”
    - Now uses hex:
      - Accommodates “1” for final version
        - “ff000onn” for draft versions
  - List usage modified to better match draft-kamp-httpbis-structure
    - Repeated quic= options instead of quic=value,value,value

# Changes to SETTINGS

## HTTP/2 SETTINGS



## HTTP/QUIC SETTINGS



- Based on draft-bishop-httpbis-extended-settings
  - HttpBis feedback: Save for protocol rev, not an HTTP/2 extension with separate identifier space
- Borrows heavily from RFC7540 SETTINGS text
- Values are length-prefixed blobs
  - Currently static 16-bit length; do we need this much?
- No ACKs, no changes

Optimization for Boolean values

If length=0, true; not sent is false

# Is this still an HTTP/2 variant?

- Separate error registry
  - Because QUIC has a unified error space for use in RST\_STREAM, CONNECTION\_CLOSE
- Shared frame registry with HTTP/2
  - But many HTTP/2 frames don't exist!
  - Of those that do, zero frames are identical between HTTP/2 and HTTP/QUIC
  - Extensions don't automatically work
- Shared SETTINGS registry with HTTP/2
  - But half the HTTP/2 settings don't exist!
  - Of those that do, one has opposite semantics
  - Extensions don't automatically work
- Why are we sharing the HTTP/2 IANA registries again?