Intro to WebTransport

The next WebSocket?

FOSDEM 2026

Max Inden

Mozilla

Max Inden

Software developer at Mozilla

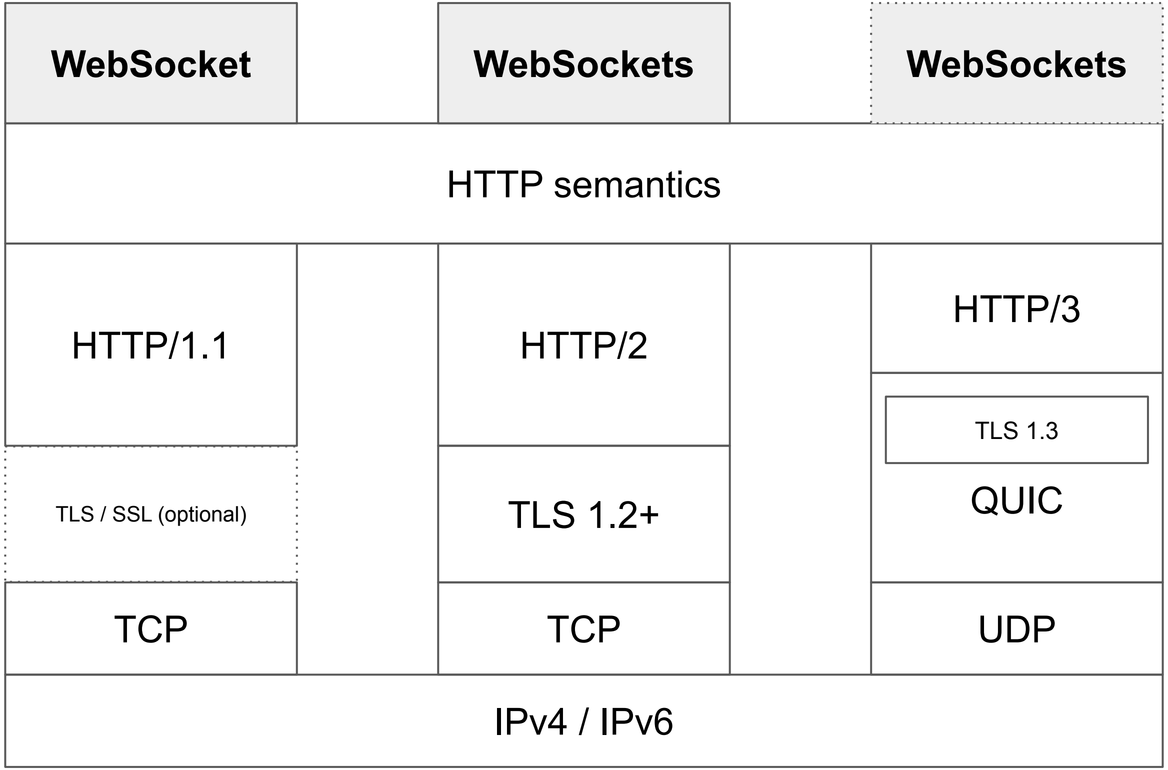
Working on Firefox's networking stack

Focusing on HTTP3 and QUIC

https://max-inden.de/

Introducing WebSocket

- Established web API
- Single reliable, bidirectional, ordered byte stream
- HTTP/1
    - One session
    - RFC 6455 - *The WebSocket Protocol* - December 2011
- HTTP/2
    - Many sessions
    - RFC 8441 - *Bootstrapping WebSockets with HTTP/2* - September 2018
- ~~HTTP/3~~
    - ~~Many sessions~~
    - ~~RFC 9220 - *Bootstrapping WebSockets with HTTP/3* - June 2022~~
    - ~~Not widely implemented~~



WebSocket

WebSockets

WebSockets

HTTP semantics

HTTP/1.1

TLS / SSL (optional)

TCP

HTTP/2

TLS 1.2+

TCP

HTTP/3

TLS 1.3

QUIC

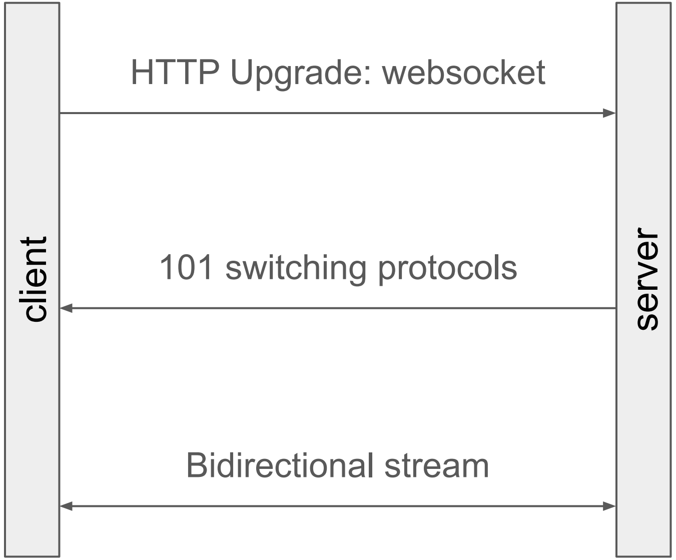
UDP

IPv4 / IPv6

	WebSocket
Upgrade	1 RTT (mostly)

WebSocket upgrade

1-RTT



client

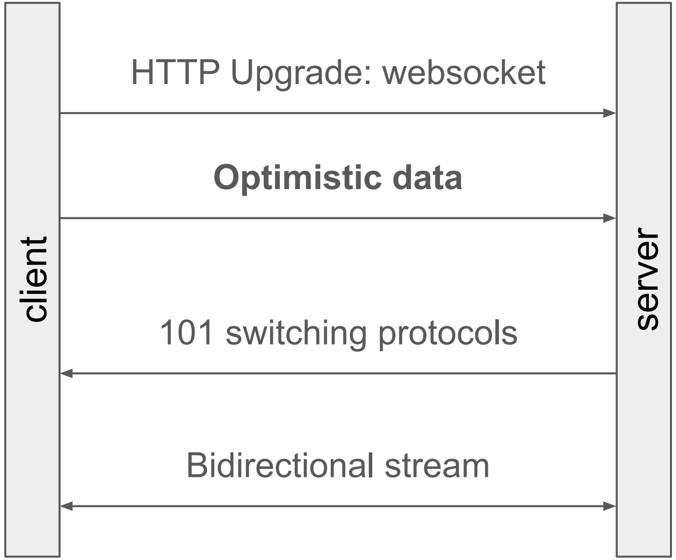
HTTP Upgrade: websocket

101 switching protocols

Bidirectional stream

server

Optimistic 0-RTT



client

HTTP Upgrade: websocket

Optimistic data

101 switching protocols

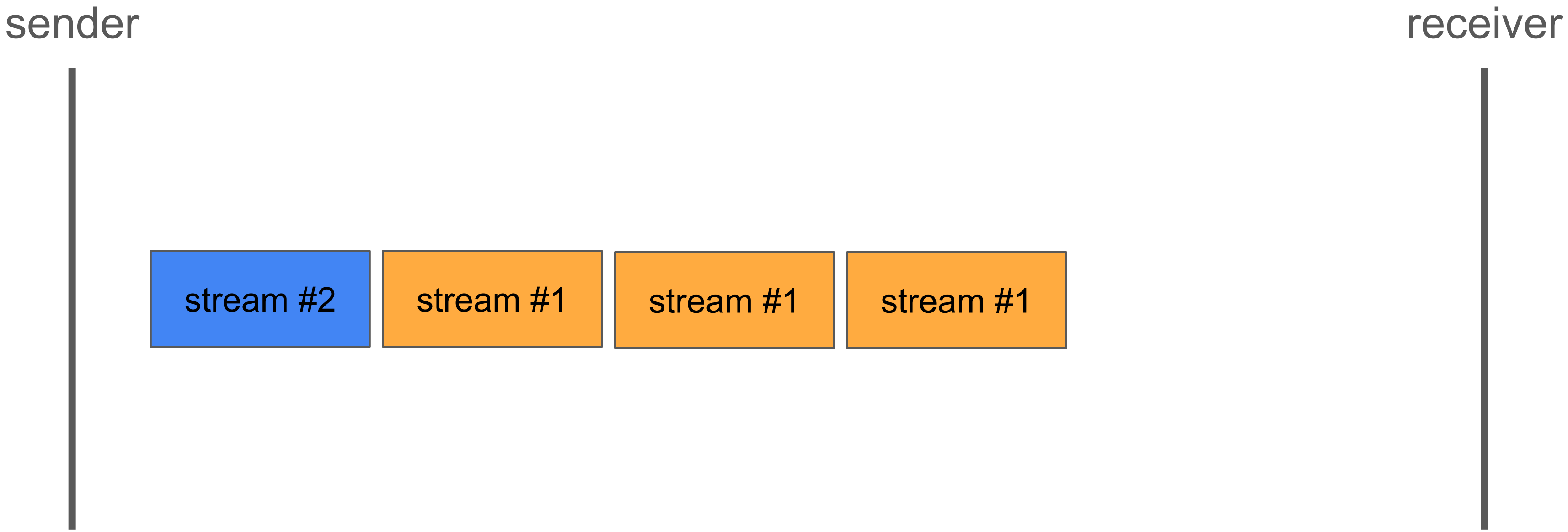
Bidirectional stream

server

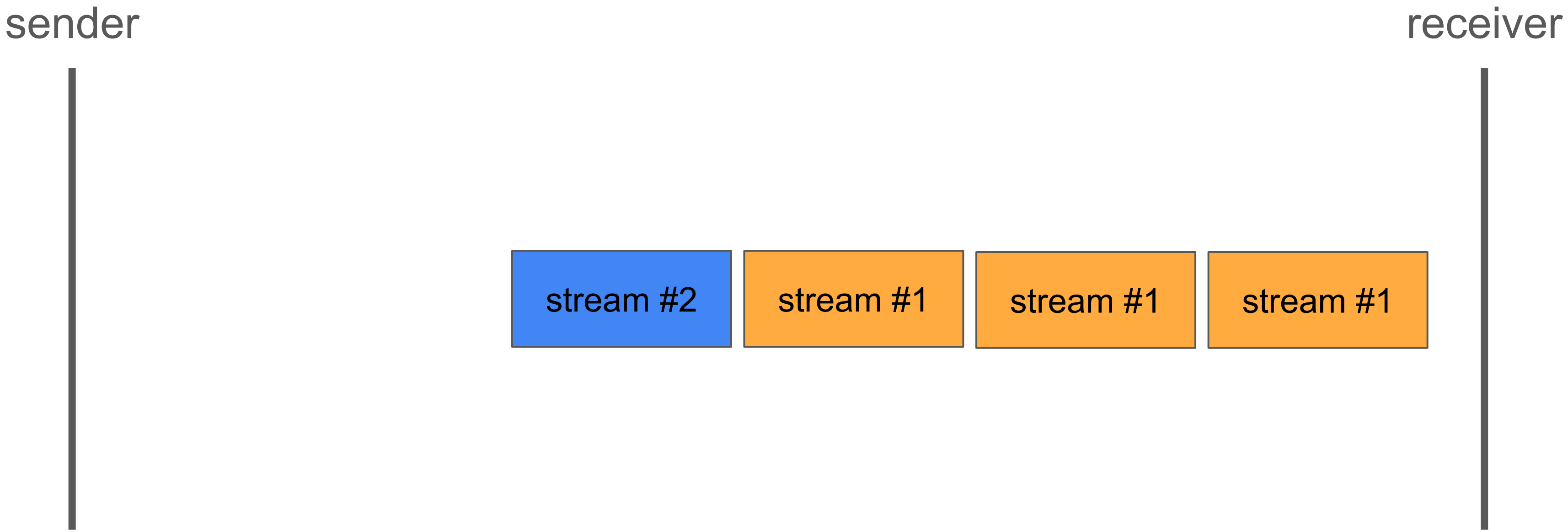
Not secure on HTTP/1 see ietf-httpbis-optimistic-upgrade

	WebSocket
Upgrade	1 RTT (mostly)
Head-of-line blocking	On session and TCP stream

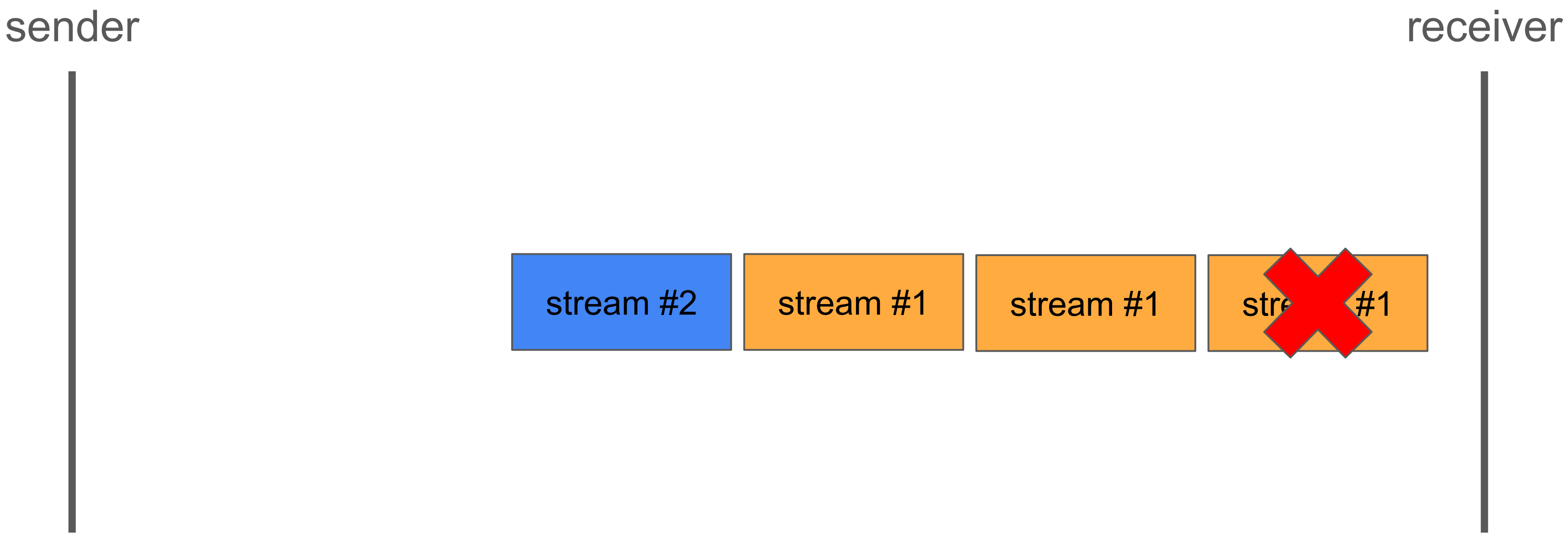
Head-of-line blocking



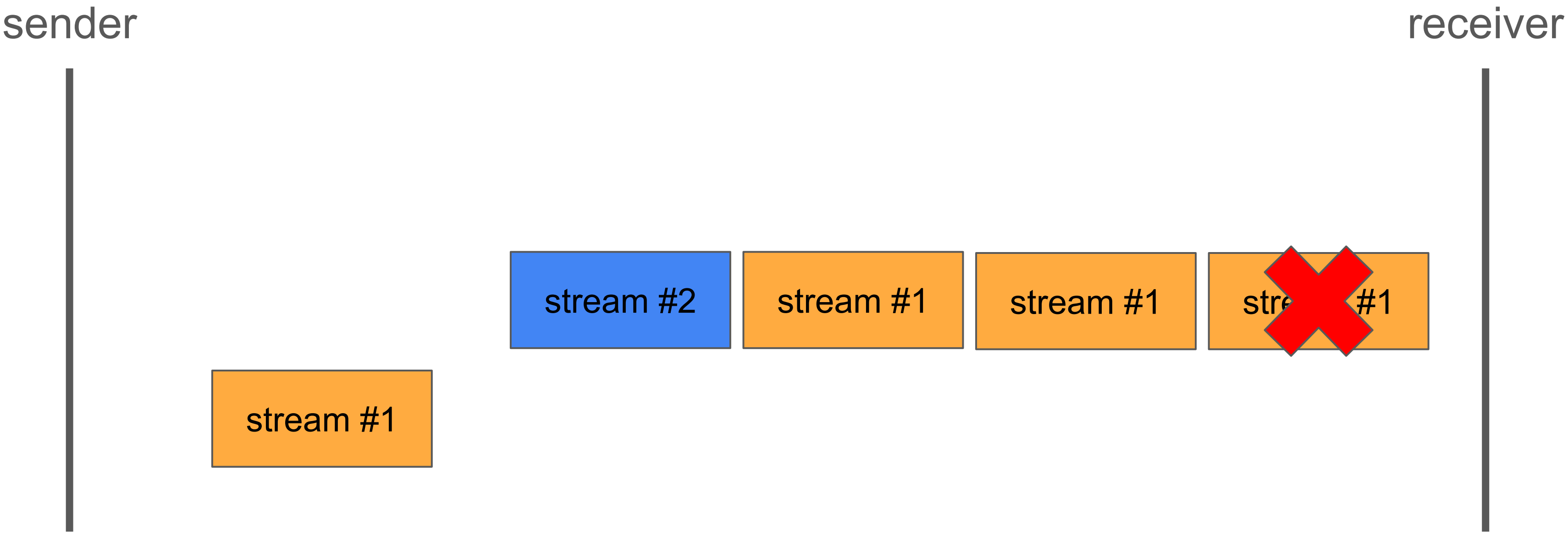
Head-of-line blocking



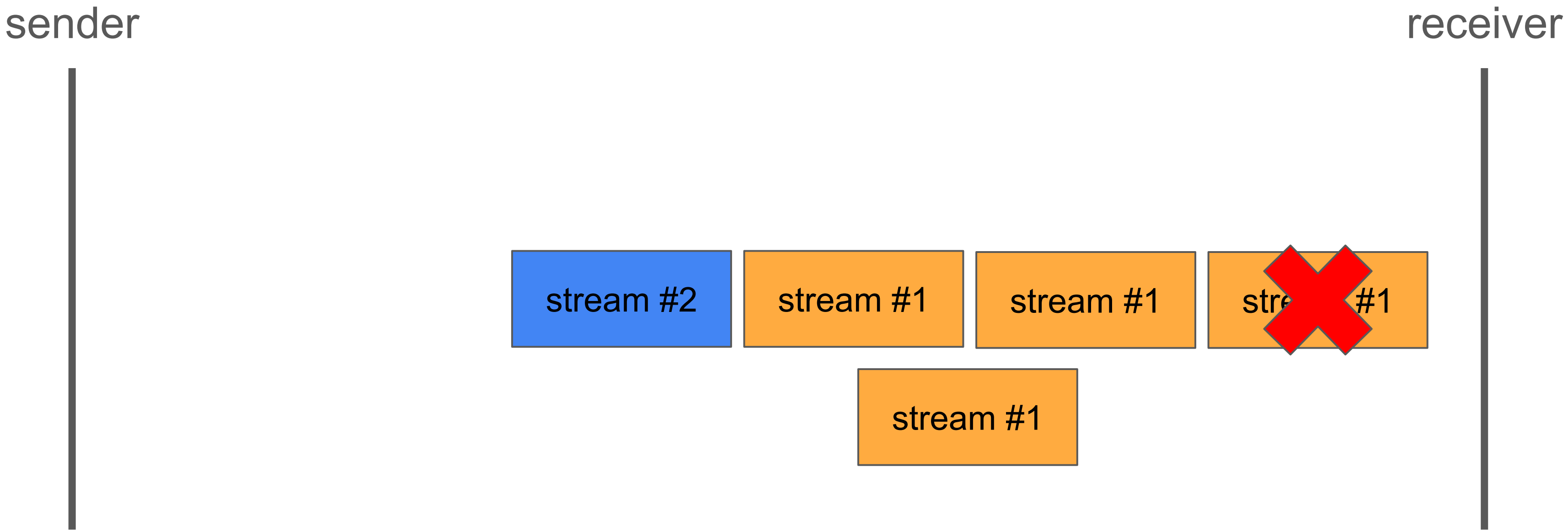
Head-of-line blocking



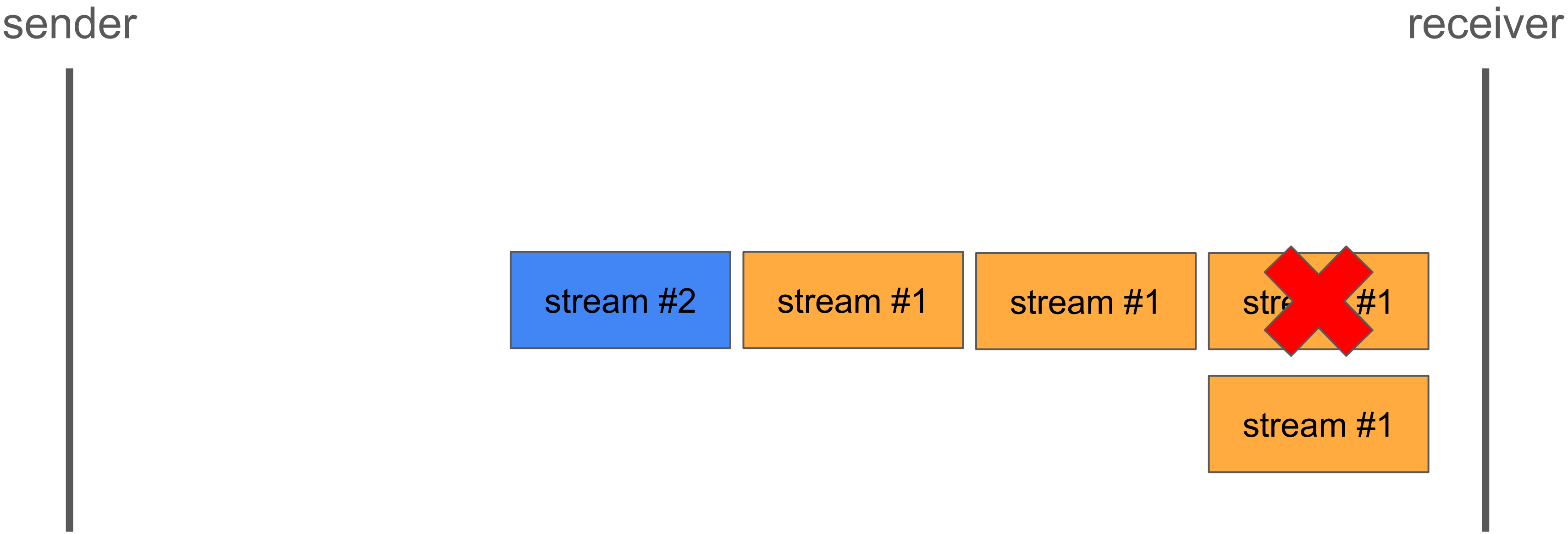
Head-of-line blocking



Head-of-line blocking



Head-of-line blocking



	WebSocket
Upgrade	1 RTT (mostly)
Head-of-line blocking	On session and TCP stream
Unreliable delivery	No

	WebSocket
Upgrade	1 RTT (mostly)
Head-of-line blocking	On session and TCP stream
Unreliable delivery	No
Connection migration	No

Connection Migration

	WebSocket
Upgrade	1 RTT (mostly)
Head-of-line blocking	On session and TCP stream
Unreliable delivery	No
Connection migration	No
Browser support	HTTP/1 & HTTP/2

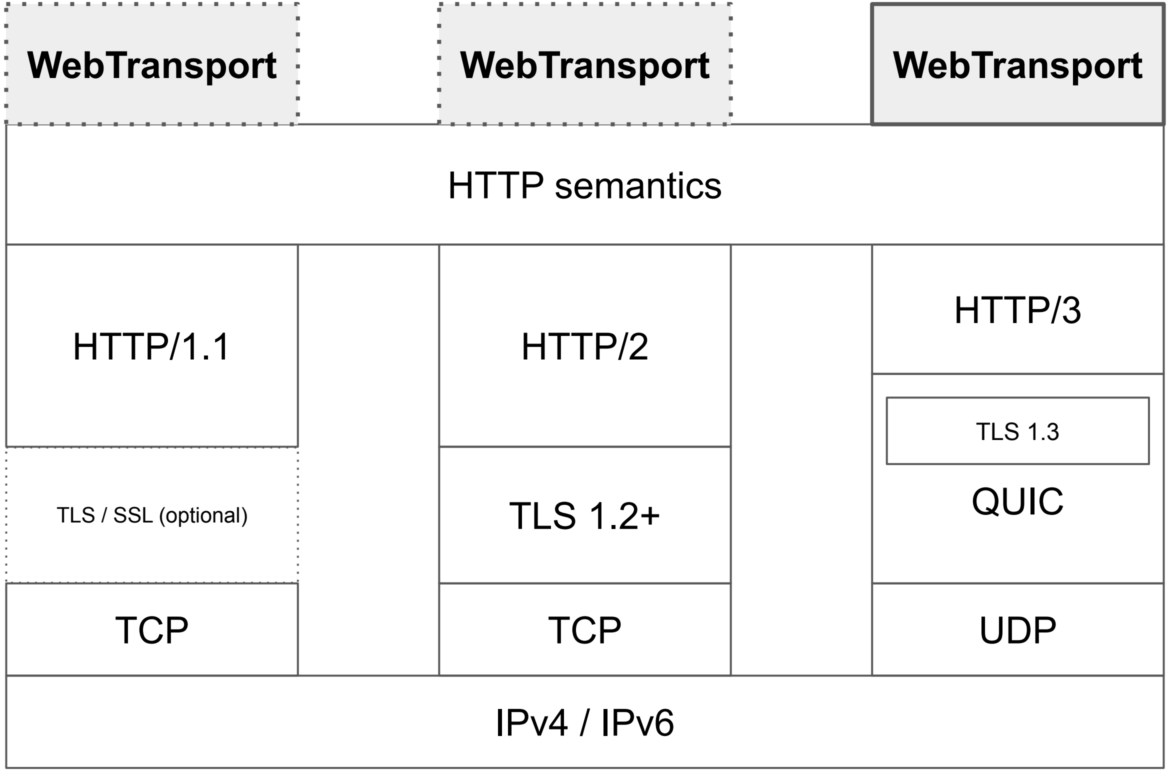
Introducing WebTransport

- New web API
- Ongoing effort at IETF and W3C
- Focus on HTTP/3 with fallback on HTTP/2
- Fine grained flow control per session
  - independent reliable streams
  - unreliable datagrams
- No head-of-line blocking on session and transport level

WebTransport use cases

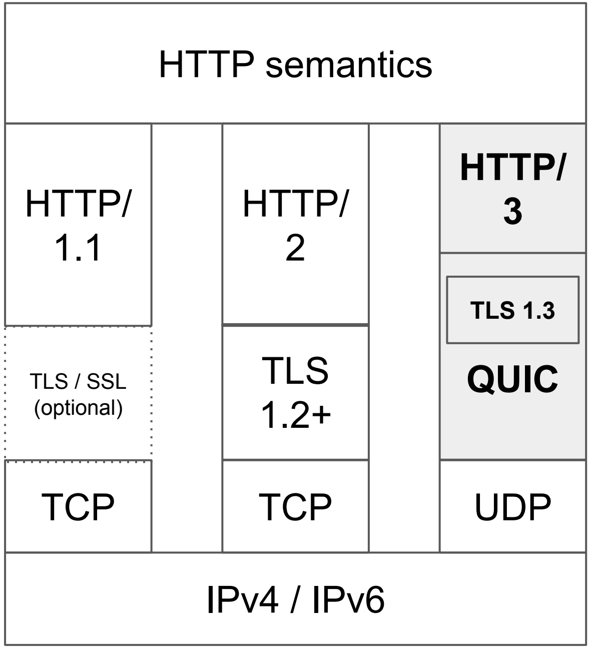
- **Cloud Gaming & Remote Desktop**: Sending user input (reliable) while receiving high-frequency video frames and input state (unreliable).
- **Live Streaming**: Pushing media chunks to a server with low overhead.
- **Collaborative Editing**: Sending cursor positions (unreliable) while ensuring document changes (reliable) are persisted.
- **Internet of Things (IoT)**: Efficiently multiplexing sensor data from thousands of devices.
- **Financial Tickers**: Delivering high-frequency market data where the latest packet is the most valuable.

Source: WebTransport explainer

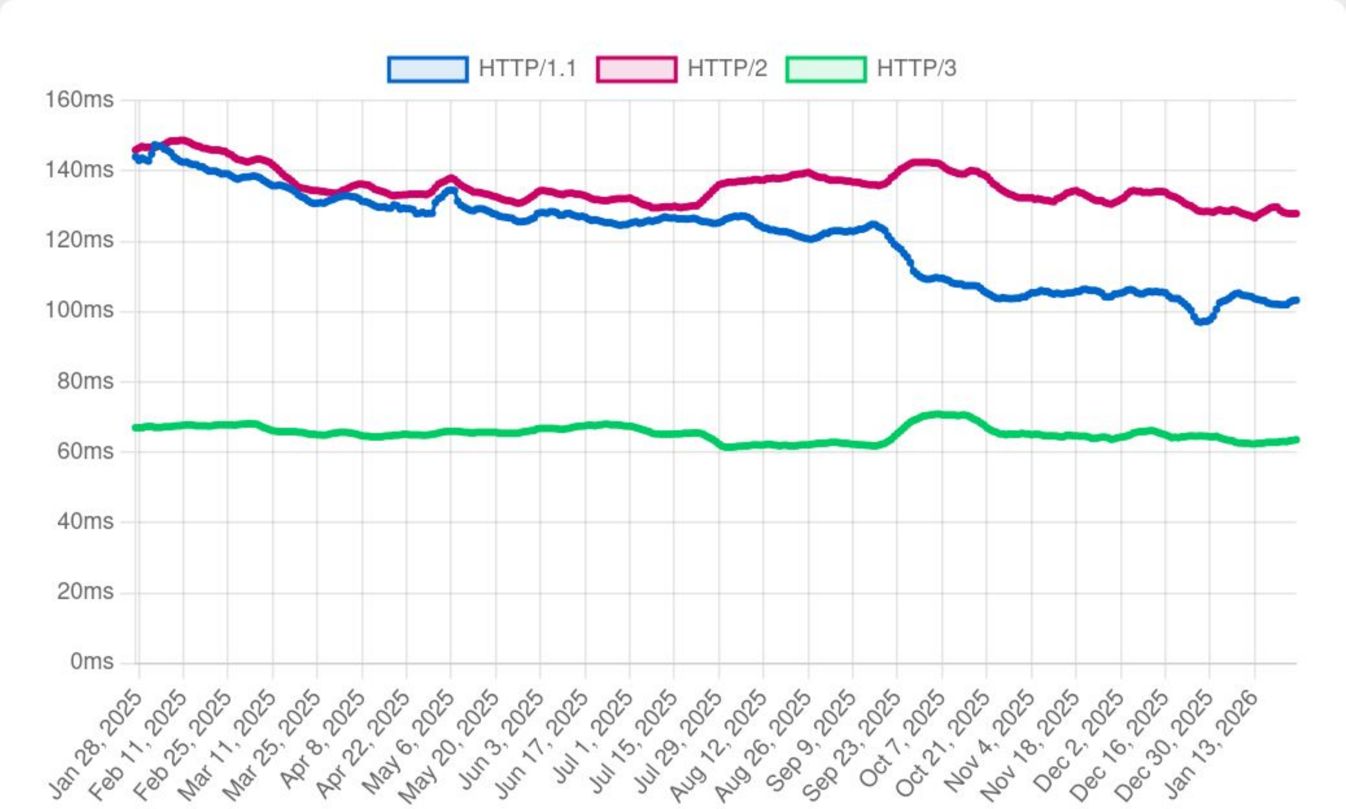

WebTransport
WebTransport
WebTransport
HTTP semantics
HTTP/1.1
HTTP/2
HTTP/3
TLS 1.3
TLS / SSL (optional)
TLS 1.2+
QUIC
TCP
TCP
UDP
IPv4 / IPv6

QUIC and HTTP/3

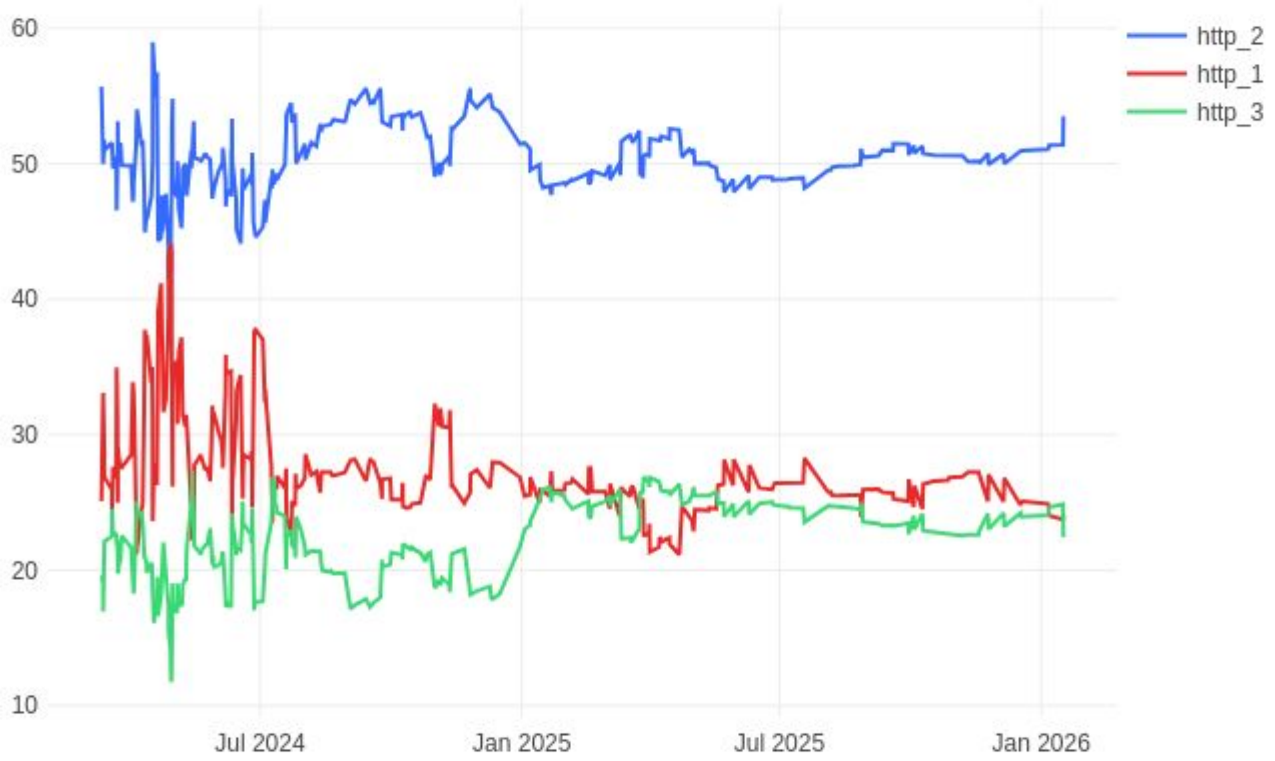
- general purpose transport protocol
- on top of UDP
- encrypted (meta) data
- 1 RTT connection establishment
- 0 RTT on consecutive connections
- reliable streams & unreliable datagrams
- no head-of-line blocking
- connection migration
- easy to evolve
- …



HTTP time to request start

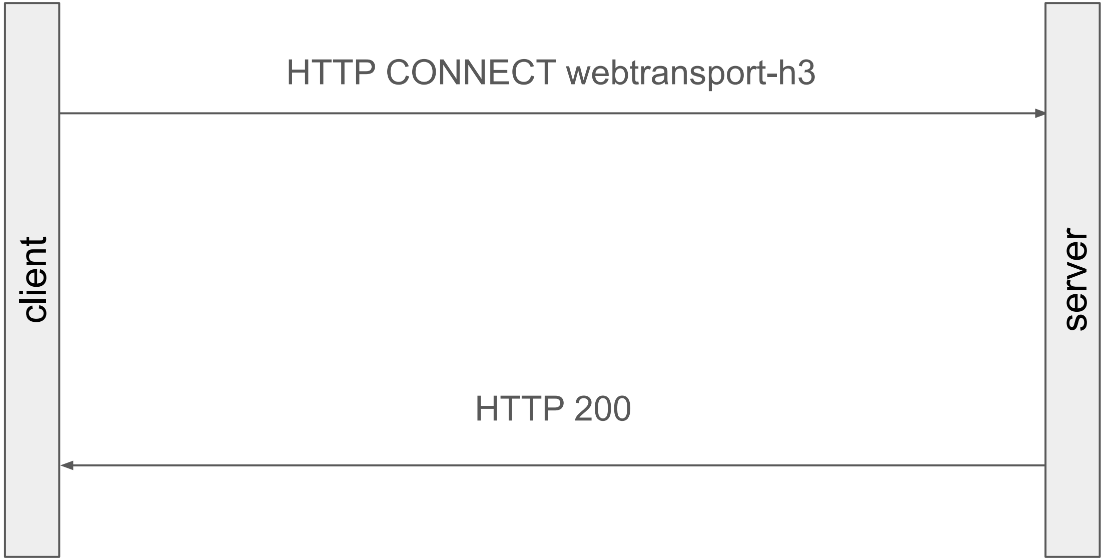


HTTP/3 adoption

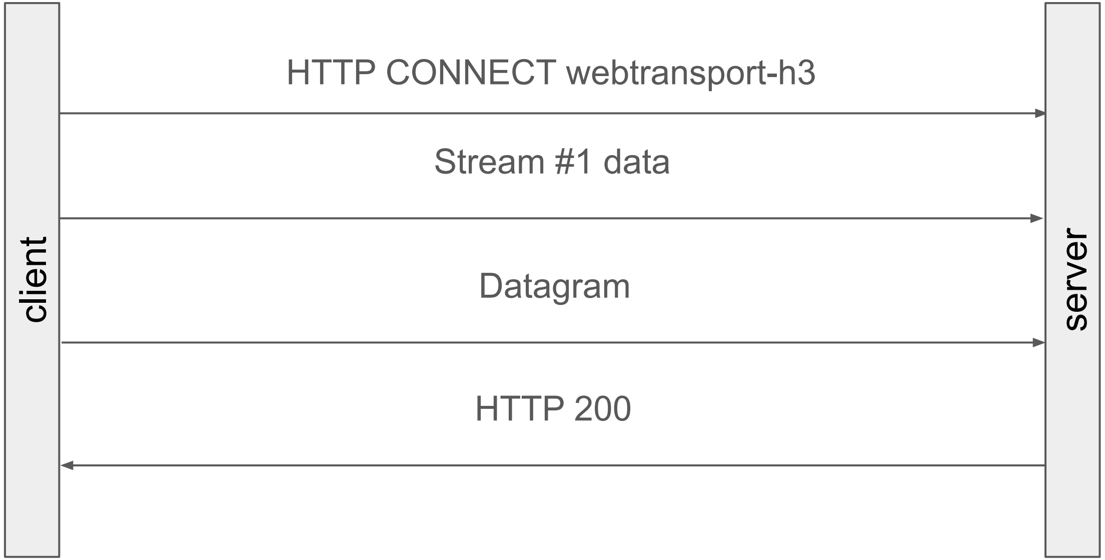


	WebSocket	WebTransport
Upgrade	1 RTT (mostly)	0 RTT
Head-of-line blocking	On session and TCP stream	
Unreliable delivery	No	
Connection migration	No	
Browser support	HTTP/1 & HTTP/2	

WebTransport upgrade



WebTransport upgrade



HTTP CONNECT webtransport-h3

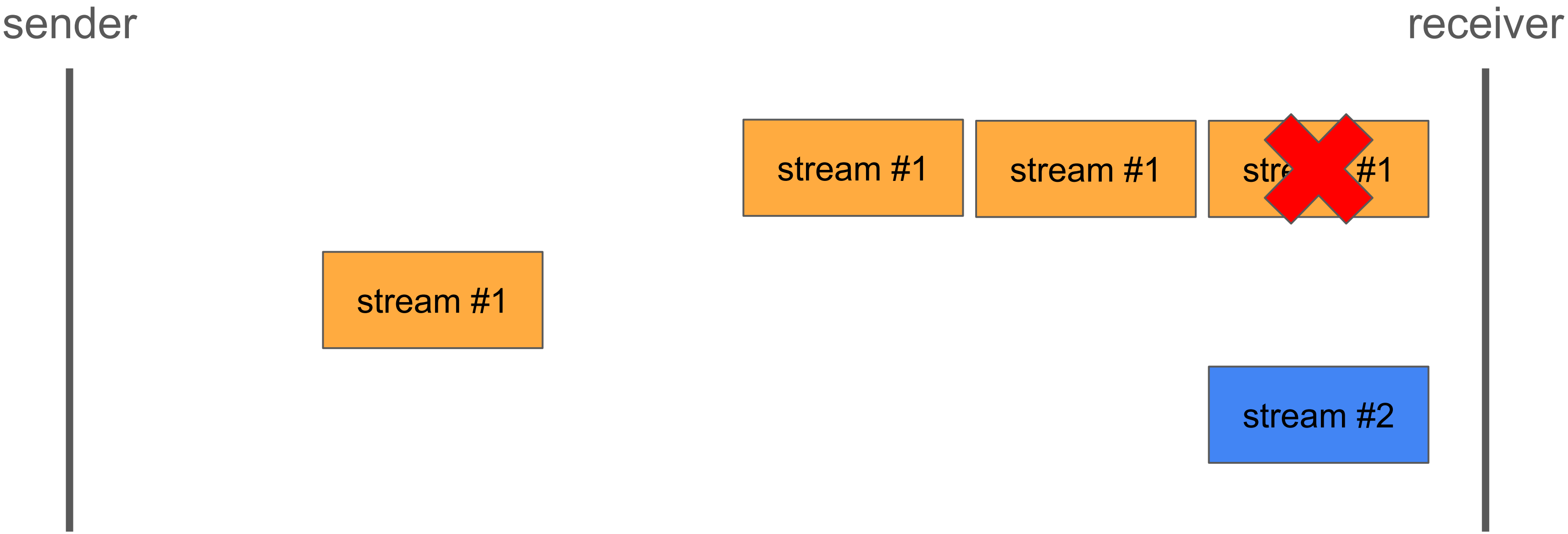
Stream #1 data

Datagram

HTTP 200

	WebSocket	WebTransport
Upgrade	1 RTT (mostly)	0 RTT
Head-of-line blocking	On session and TCP stream	No
Unreliable delivery	No	
Connection migration	No	
Browser support	HTTP/1 & HTTP/2	

Head-of-line blocking



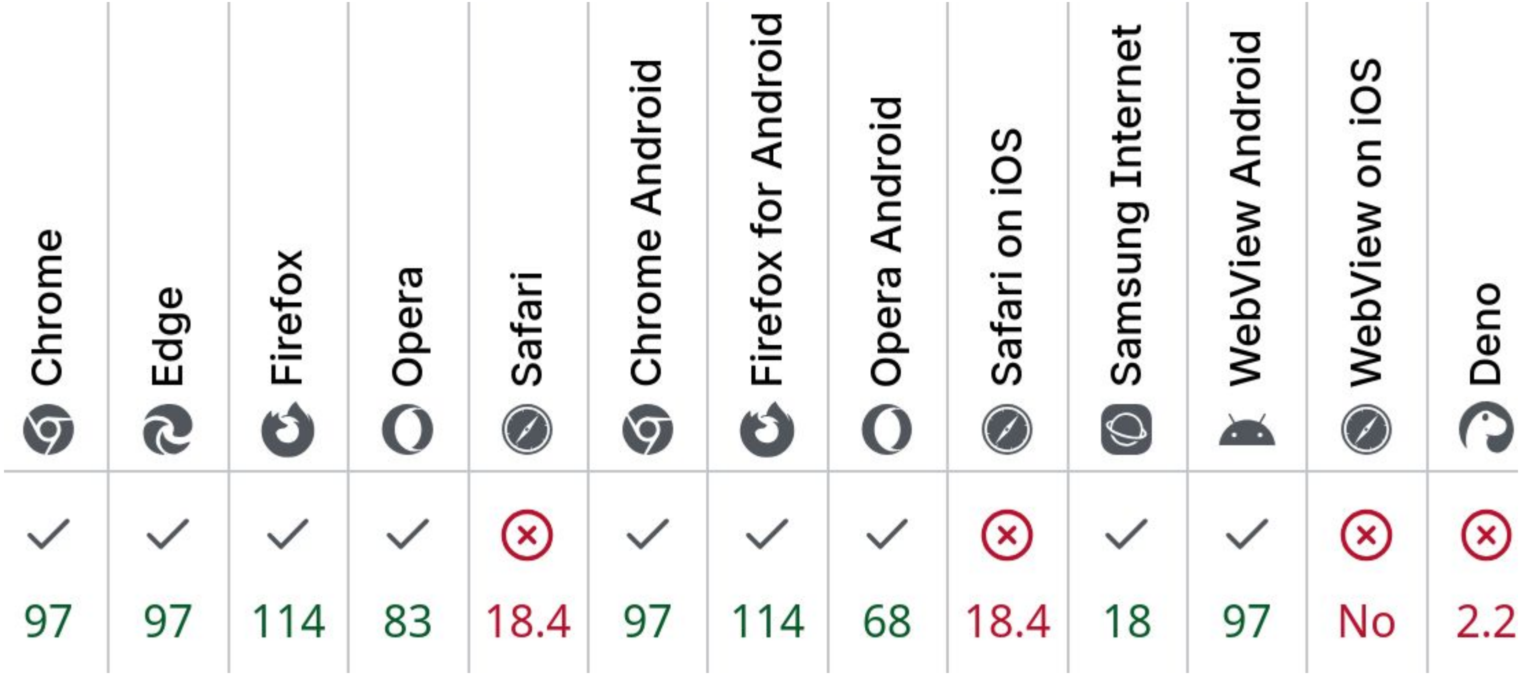
	WebSocket	WebTransport
Upgrade	1 RTT (mostly)	0 RTT
Head-of-line blocking	On session and TCP stream	No
Unreliable delivery	No	Yes via QUIC datagrams
Connection migration	No	
Browser support	HTTP/1 & HTTP/2	

	WebSocket	WebTransport
Upgrade	1 RTT (mostly)	0 RTT
Head-of-line blocking	On session and TCP stream	No
Unreliable delivery	No	Yes via QUIC datagrams
Connection migration	No	Yes via QUIC
Browser support	HTTP/1 & HTTP/2	

Connection Migration

	WebSocket	WebTransport
Upgrade	1 RTT (mostly)	0 RTT
Head-of-line blocking	On session and TCP stream	No
Unreliable delivery	No	Yes via QUIC datagrams
Connection migration	No	Yes via QUIC
Browser support	HTTP/1 & HTTP/2	HTTP/3, upcoming HTTP/2

Support across browsers



Chrome	Edge	Firefox	Opera	Safari	Chrome Android	Firefox for Android	Opera Android	Safari on iOS	Samsung Internet	WebView Android	WebView on iOS	Deno
✓	✓	✓	✓	⊗	✓	✓	✓	⊗	✓	✓	⊗	⊗
97	97	114	83	18.4	97	114	68	18.4	18	97	No	2.2

https://developer.mozilla.org/en-US/docs/Web/API/WebTransport

Status at W3C and IETF

- Draft at W3C
  - going to wide review for Candidate Recommendation soon
- IETF
  - HTTP/3 draft 14
  - HTTP/2 draft 13
- No major changes expected

Users

- Low adoption thus far
- Media over QUIC
    - Media over QUIC (moq) will develop a simple **low-latency media** delivery solution for **ingest** and **distribution** of media. This solution addresses use cases including **live streaming, gaming, and media conferencing** and will scale efficiently. The solution will be implementable in **both browser and non-browser** endpoints

Try it out

- Test websites like https://wt-ord.akaleapi.net/echo/.
- Deploy your own server e.g. via webtransport-go.

```
const transport = new WebTransport(url);
await transport.ready;

const writer = transport.datagrams.writable.getWriter();
const data = new Uint8Array([42]);
writer.write(data);
```

Thank you!

- Questions? Talk to us.
- Help us build a healthy Internet.
- In person or mail@max-inden.de or @mxinden.
- We got stickers :)