

Who is ready for HTTP/3?

Miloslav Pojman
@MiloslavPojman

Hive Talks
February 25, 2020

<https://pojman.cz/2020/http3/>

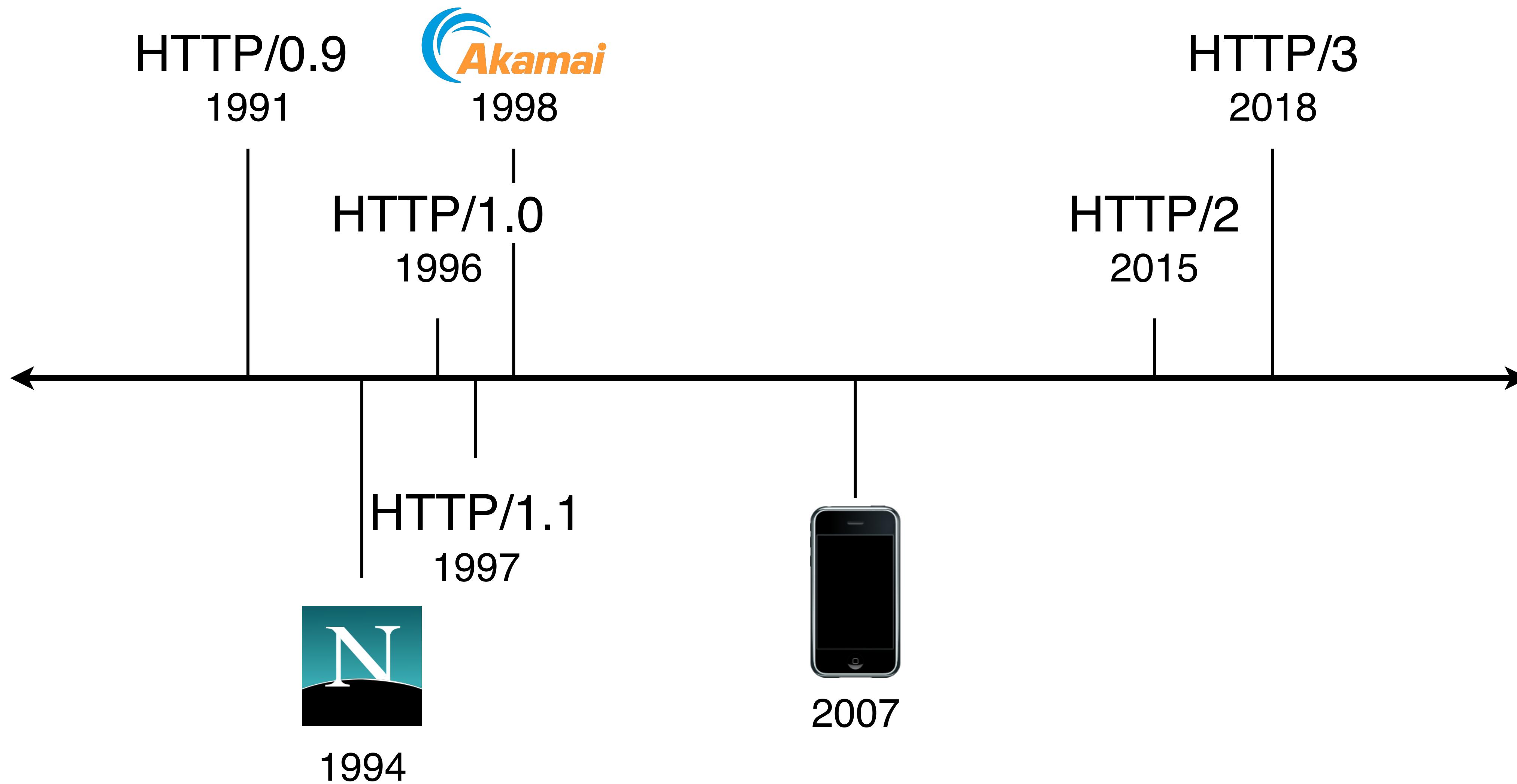


Who is ready for HTTP/3?

Miloslav Pojman

@MiloslavPojman

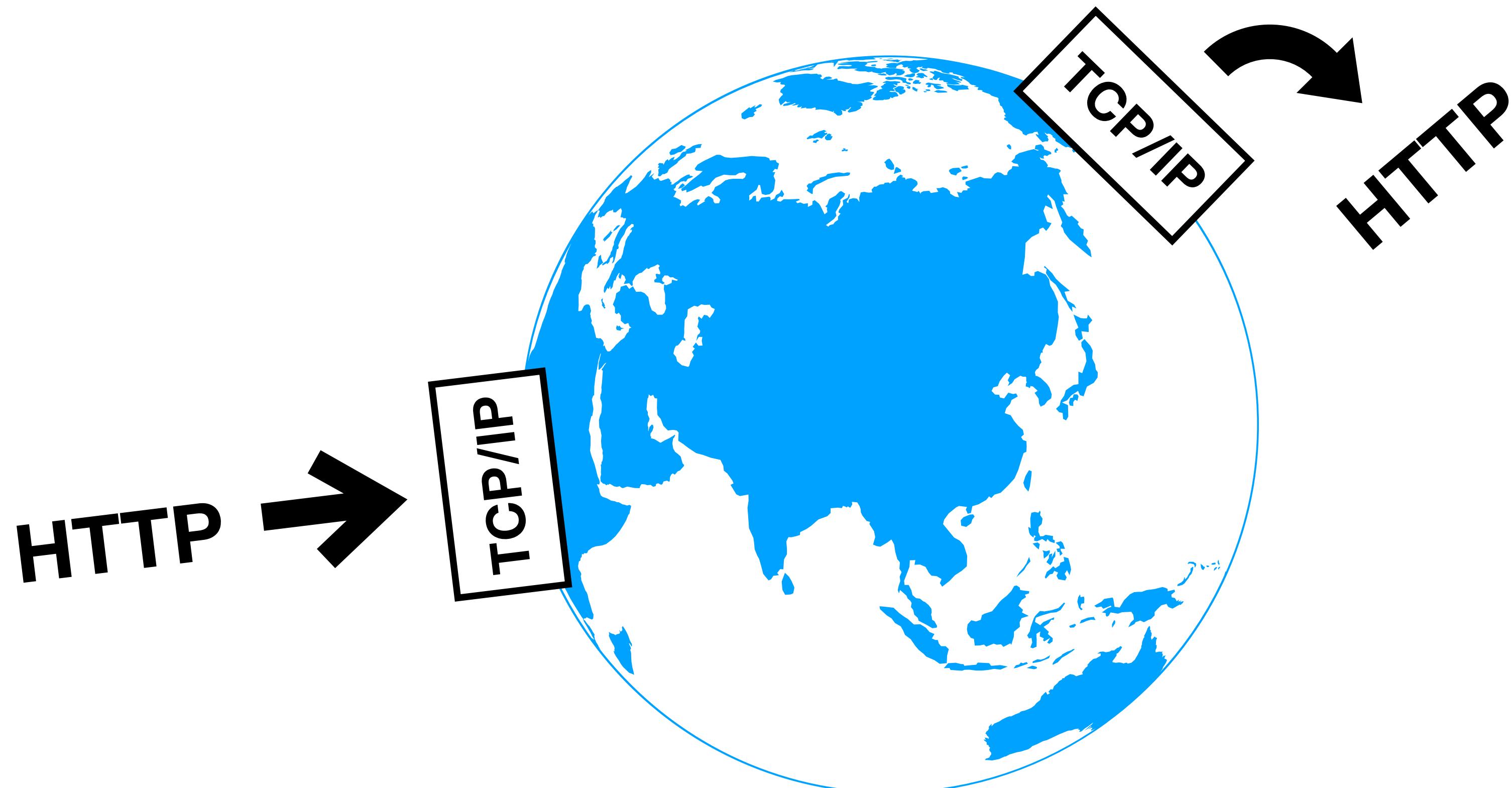
HTTP History



Internet



TCP/IP



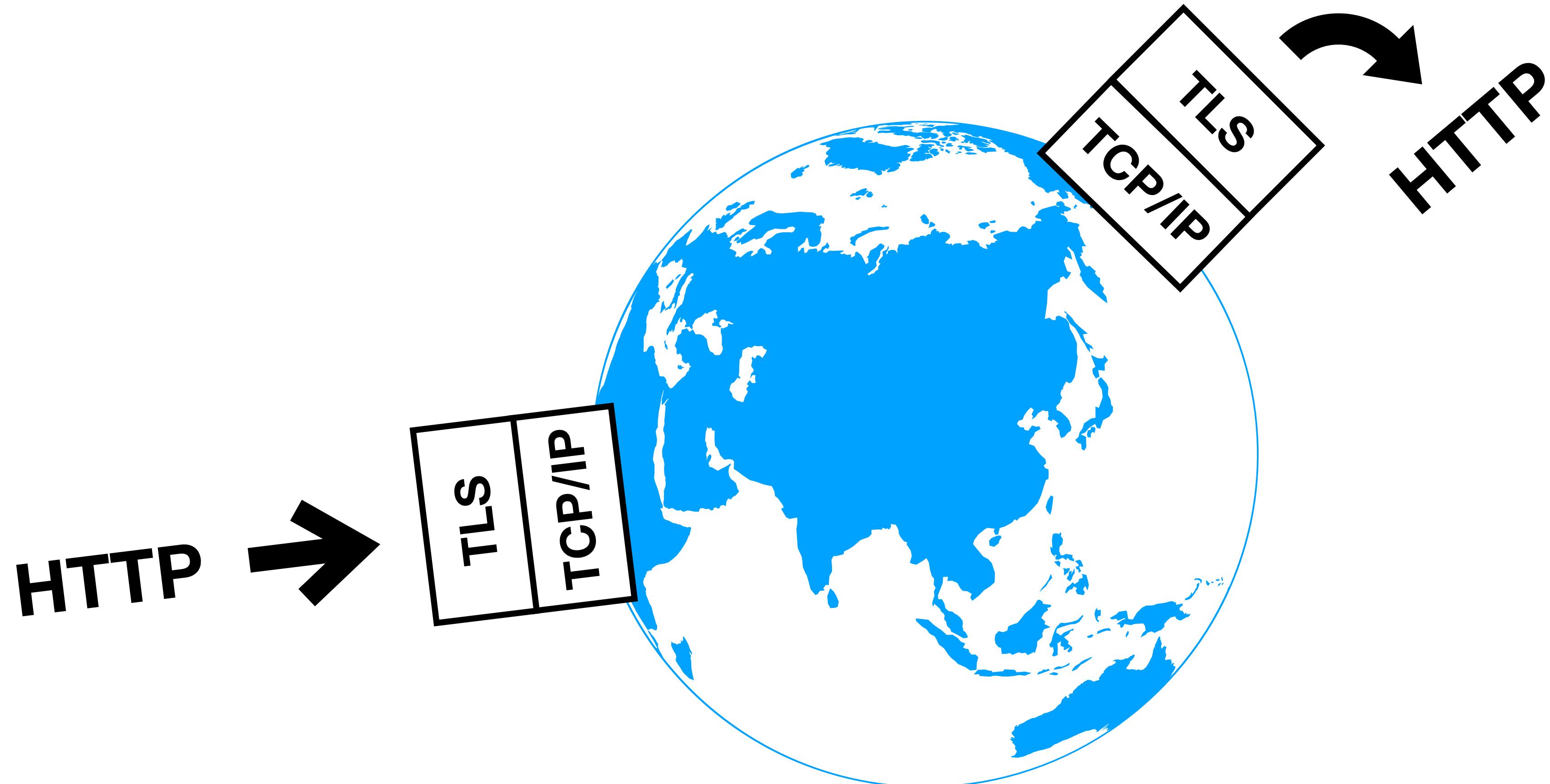
HTTP

```
$ telnet google.com 80
Trying 216.239.34.117...
Connected to google.com.
Escape character is '^]'.
GET / HTTP/1.0
```

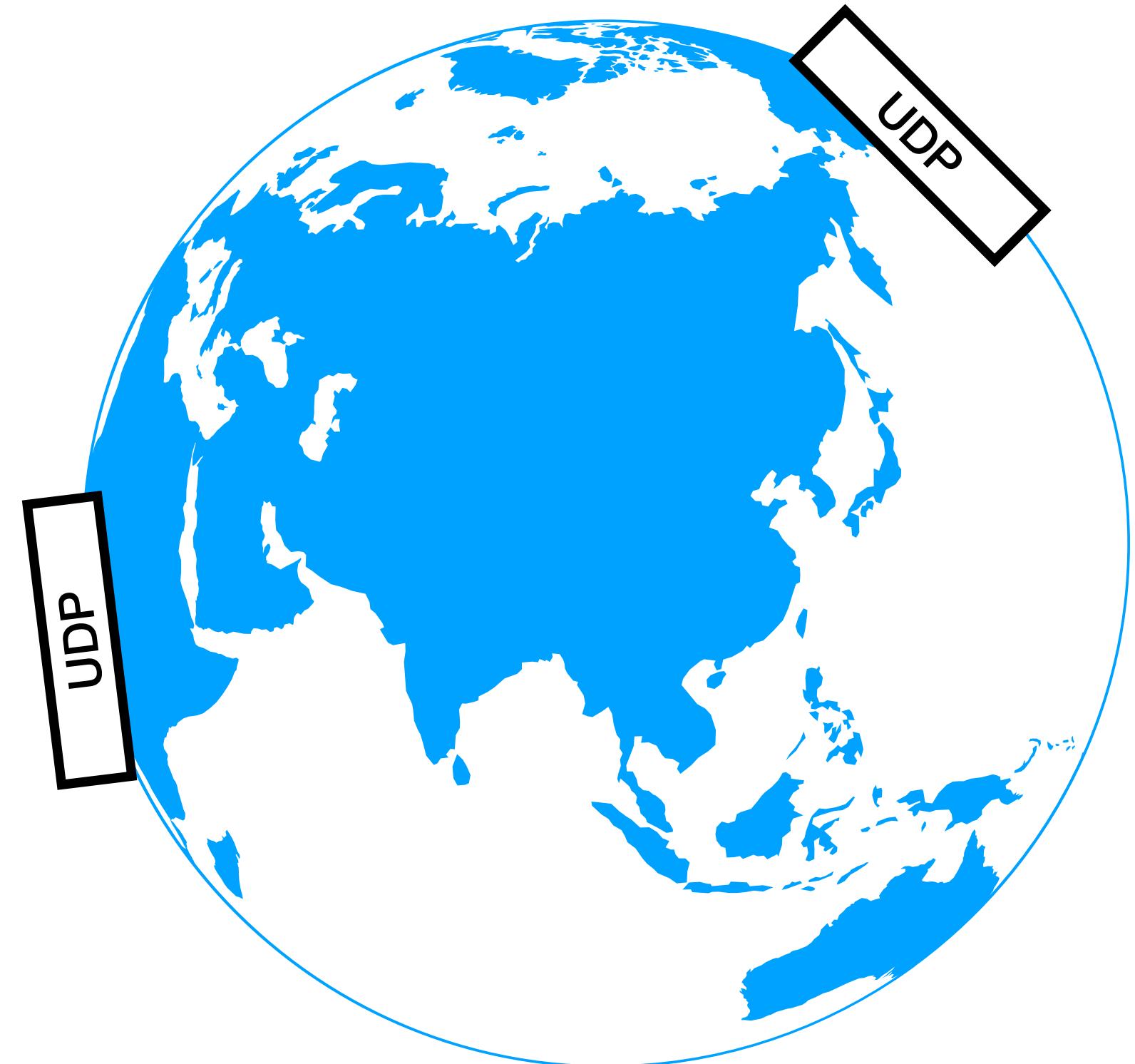
```
HTTP/1.0 200 OK
Date: Mon, 24 Feb 2020 18:14:17 GMT
```

...

TCP/IP + TLS



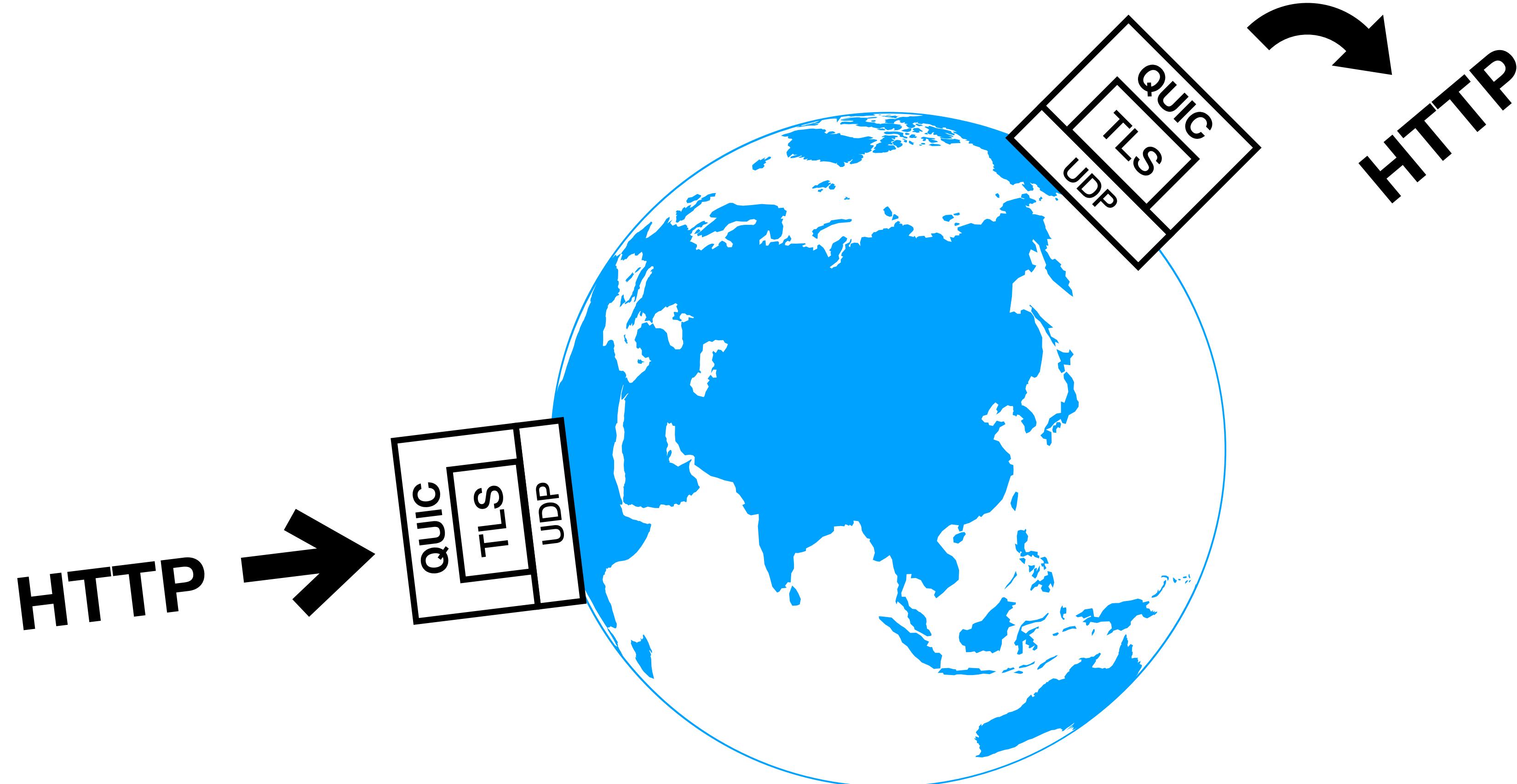
UDP





QUIC

QUIC



HTTP/3

HTTP over QUIC



275 000 servers
140 Tbps peak traffic

QUIC enabled globally



Google QUIC vs IETF QUIC



Name	Method	Status	Protocol	Type	Size
www.youtube.com	GET	200	h2	document	47.6 KB
generate_204	GET	204	h2	text/plain	187 B
web-animations-next-lite....	GET	200	http/2+quic/46	script	15.5 KB
custom-elements-es5-ad...	GET	200	http/2+quic/46	script	866 B
webcomponents-sd.js	GET	200	http/2+quic/46	script	21.5 KB
desktop_polymer_v2-vfl5...	GET	200	http/2+quic/46	document	361 KB
scheduler.js	GET	200	http/2+quic/46	script	2.7 KB
www-tampering.js	GET	200	http/2+quic/46	script	3.8 KB
www-prepopulator.js	GET	200	http/2+quic/46	script	424 B
spf.js	GET	200	http/2+quic/46	script	12.2 KB
network.js	GET	200	http/2+quic/46	script	4.7 KB
css?family=YT%20Sans...	GET	200	http/2+quic/46	stylesheet	899 B
www-main-desktop-hom...	GET	200	http/2+quic/46	stylesheet	1.5 KB
www-onepick-2x-webp-v...	GET	200	http/2+quic/46	stylesheet	433 B
desktop_polymer_v2.js	GET	200	http/2+quic/46	script	798 KB

Google QUIC support

Chrome (desktop and mobile)

IETF QUIC support

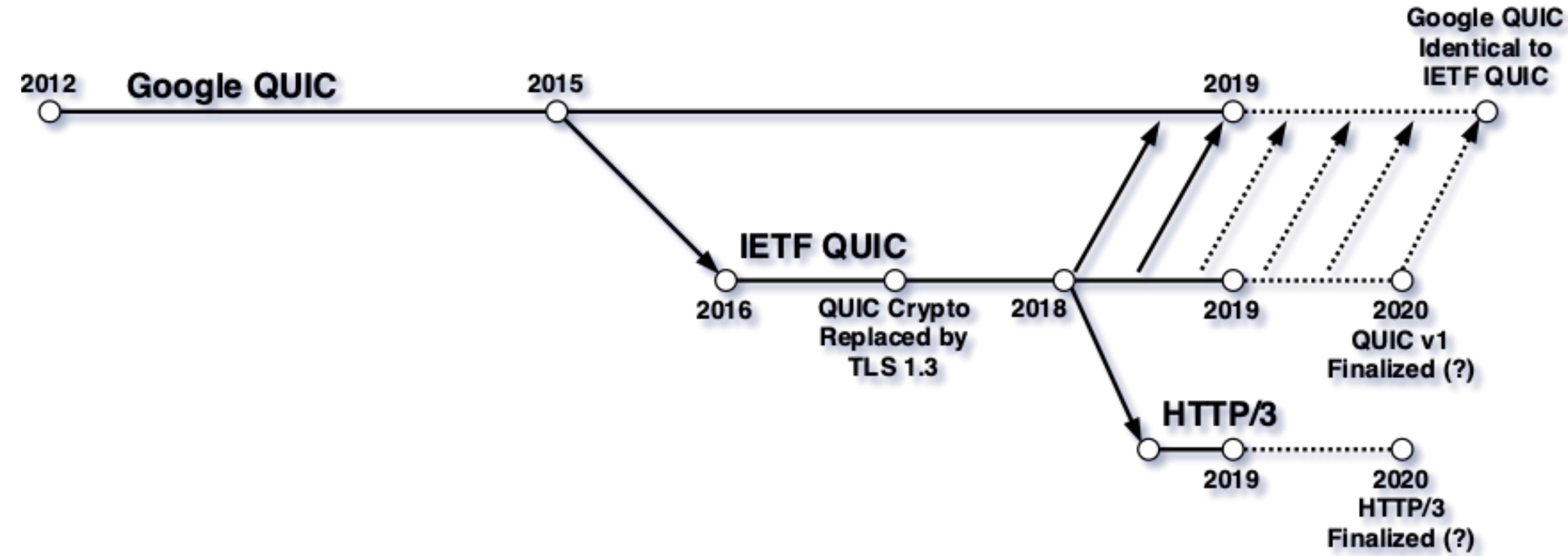
- Chrome Canary
- Firefox Nightly
- curl



	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X
1	server →	h2o/quickly	quant	ngtcp2	mvfst	picoQUIC	msquic	f5	ATS	quiche	isquic	ngx_quic	AppleQUIC	quic-go	Quinn	aioquic	~gQUIC	quicker	Neqo	Haskell QUIC	Pandora	Kwik&Flupke	Spindump	AkamaiQUIC
2	client ↓																							
3	h2o/quickly	VHDCRZSU 3	VHDCRZS			VHDCRZSU 3		VHDCRZSU																
4	quant	VHDCRZSQ U 3	VHDCRZSQ MBAUPELT	VHDCRZSQ MBAUT 3	VHDCRZQ MBT 3	VHDCRZSQ MBAUT 3	VHDCRZSQ MBUPT	VHDCRZQ UET 3	VHDCRZSQ MB 3	VHDCSQ T 3	VHDCRZSQ MBUPET 3	VHDCRZQ 3	VHDCQ MU 3		VHDCRZSQ MBUP 3	VHDCRQ 3		VH		VHDCR				
5	ngtcp2	VHDCR U 3	V	VHDCRZS MBAUL 3dp	VHDCRZ MBT 3d	VHDCRS MBA 3	VHDCR	VHDCRS UT 3	VHDCRS MBA 3	VHDCRZ 3	VHDCRZS MBAU 3dp					VHDCRZS 3dp	VHDCR 3	VHDCRS 3						
6	mvfst	VHDCRZSQ 3	VHDCRZQ 3d	VHDCRZS MBALT 3d	VHDCRZQ 3	VHDCRSQ	VHDCRSZ T 3d	VHDCRSZ T 3d	VHDCRSQ	VHDCRZS T 3d	VHDCRZSQ MBAUT 3					VHDCRQ 3								
7	picoQUIC	VHDCRZSQ UT 3	VHDCRZSQ MBUP	VHDCRZSQ MBAUT 3	VHDCRZQ MBLT 3	VHDCRZSQ MBAUPLT 3	VHDCRSQ MUP	VHDCRSQ U 3	VHDCRSQ MB 3	VHDCRSQ 3	VHDCRZSQ MBAUTP 3					VHDCRZSQ MBUPLT 3	VHDCRQ B 3	VHdRZSQ 3	VHDCQ 3					
8	msquic	VHCRQ U	VHDCRZSQ BUP	VHCRQ MU	VHCQ	VHDCRZSQ MBUPLT	VHDCRSQ MUBPLT	VHCRZSQ U	VHDCRZSQ M	VHDCRZQ	VHCRSQ MUB	V	-	-	V	VHDCRZSQ MUBPLT	VHCQ	-	-	VHCDSQ	-	-	VHCQ	
9	f5	VHDCS T 3d						VHDCS T 3d		VHDCS	VHDCS 3													
10	ATS	VHDCRSQ 3	VHDCRSQ 3	VHDCRQ 3	VHDCRSQ 3	VHDCRSQ 3	VHDCRSQ	VHDCRSQ 3	VHDCRSQ 3	VHDCSRQ	VHDCRSQ 3					VHDCRSQ 3	VHDCRQ 3	VHDRS	3	VHDQ	3			
11	quiche																							
12	isquic	HDCRSQ 3	V	VHDCRSQ 3dp	VHDCRQ T 3dp	VHDCRSQ PT 3		VHDCRSQ ET 3d	VHDCRSQ 3	VHDCRSQ T 3	VHDCRSQ MPET 3dp					VHDCRSQ PT 3dp	VHDCRQ 3d	VHDSR	3	VHDQ	3			
13	ngx_quic																							
14	AppleQUIC	VHDC 3	VHDCS P	VHDC T 3d	VHDC T 3d	VHDCS PT 3	VHDCS 3	VHDCS 3d	VHDCS 3	VHDCS T 3	VHDCS 3d		VHDCS PU 3			VHDCS P 3d	VHDC 3d	VHDCS	3					
15	quic-go																							
16	Quinn																							
17	aioquic	VHDCRZSQ U	VHDCRZSQ BU	VHDCRZSQ MBUL 3dp	VHDCRZQ BLT 3dp	VHDCRZSQ MBUPLT 3	VHDCRZSQ MBUPL	VHDCRZSQ U 3d	VHDCRZSQ MB 3	VHDCRZSQ 3	VHDCRZSQ MBUPT 3dp	V	-	-	V	VHDCRZSQ MBUPLT 3dp	VHDCRQ 3d			VHDCQ 3				
18	~gQUIC	VHDCR 3	V	VHDCRS	VHDCR B 3d	VHDCRS	VHDCR B 3d	VHDCRS	VHDCRS	VHDCRS	VHDCRS	V	-	-	V	VHDCRS B 3d	VHDCR B 3d	VHDCRS	-	-	VHDC B 3d			
19	quicker																							
20	Neqo	VHDCS 3d	VHDCS	VHDCS d	VHDCS 3d	VHDCS 3d	VHDCS 3d	VHDCS 3d	VHDCS 3d	VHDCS 3d	VHDCS 3d					VHDCS 3d	VHDCS 3d	VHDCS	3d	VHDCRS U 3dp				
21	Haskell QUIC	VHDRZSQ	VHDRZSQ	VHDRZSQ	VHDRZQ	VHDRZSQ	VHDRZSQ	VHDRZSQ	VHDRZSQ	VHDRZSQ	VHDRZSQ					VHDRZSQ	VHDRQ		VHDRZSQ		VHDQ			
22	Pandora																							
23	Kwik&Flupke																							
24	Spindump	VHDCZQ UL	VHDCZQ UPL3	VHDCZQ UL3	VHDCZQ UL3	VHDCZQ UPL	VHDCZQ UPL3	VHDCZQ UL	VHDCZQ UL	VHDCQ UL3	VHDCZQ UPL3		VHDC L			VHDCZ UPL		VHDCZQ UL		VHDC UL		VHDC UL		
25	AkamaiQUIC																							

IETF QUIC compatibility

<https://docs.google.com/spreadsheets/d/1D0tW89vOoaScs3IY9RGC0UesWGAWxE6xyLk0I4JtvTVg/edit>



QUIC history

Alt-Svc

```
alt-svc:  
  quic=":443"; ma=2592000; v="46,43",  
  h3-Q050=":443"; ma=2592000,  
  h3-Q049=":443"; ma=2592000,  
  h3-Q048=":443"; ma=2592000,  
  h3-Q046=":443"; ma=2592000,  
  h3-Q043=":443"; ma=2592000
```

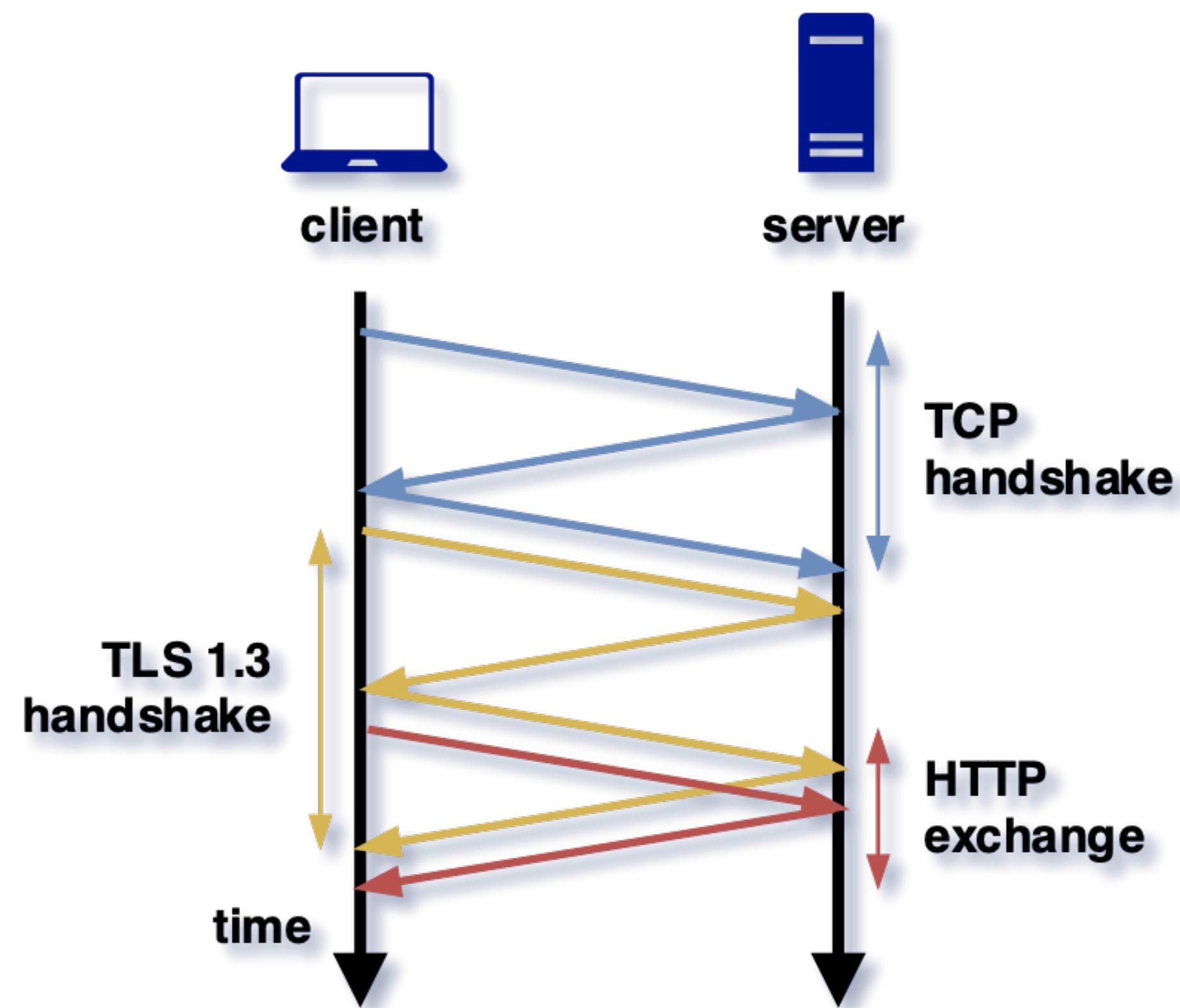
HTTP/3 Advantages



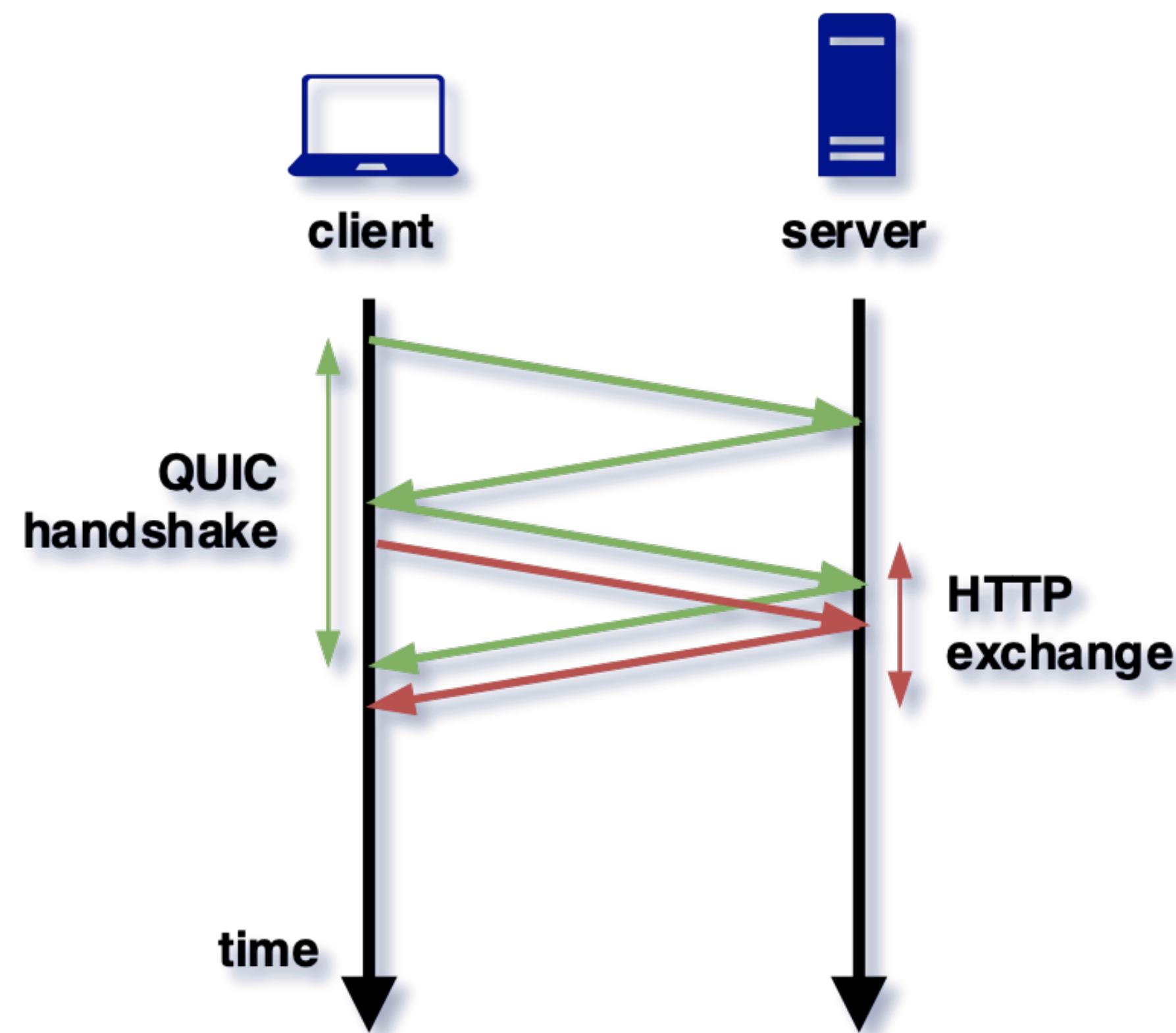
Independent streams

Photo by Chris Brignola on Unsplash

HTTP over TCP + TLS



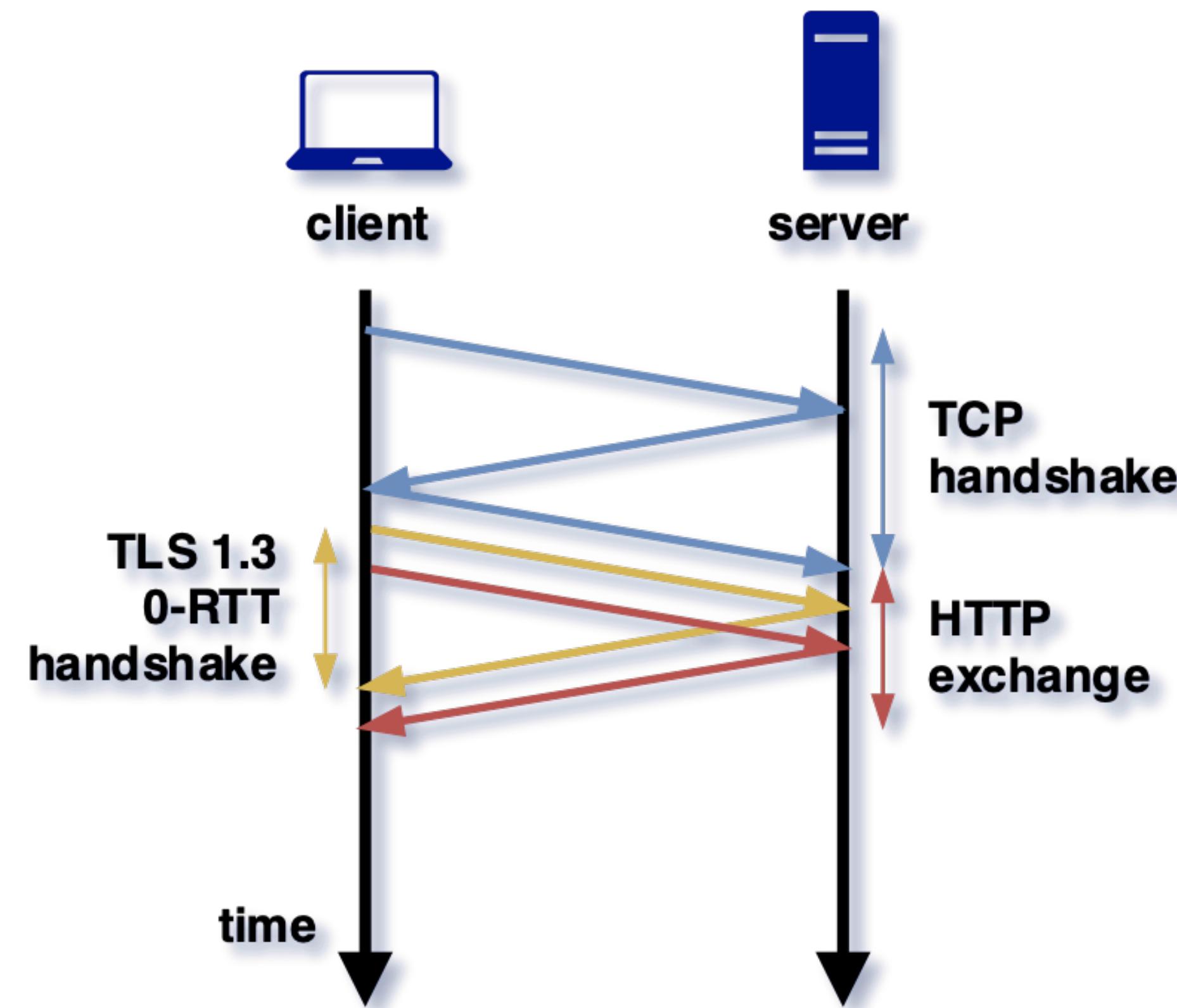
HTTP over QUIC



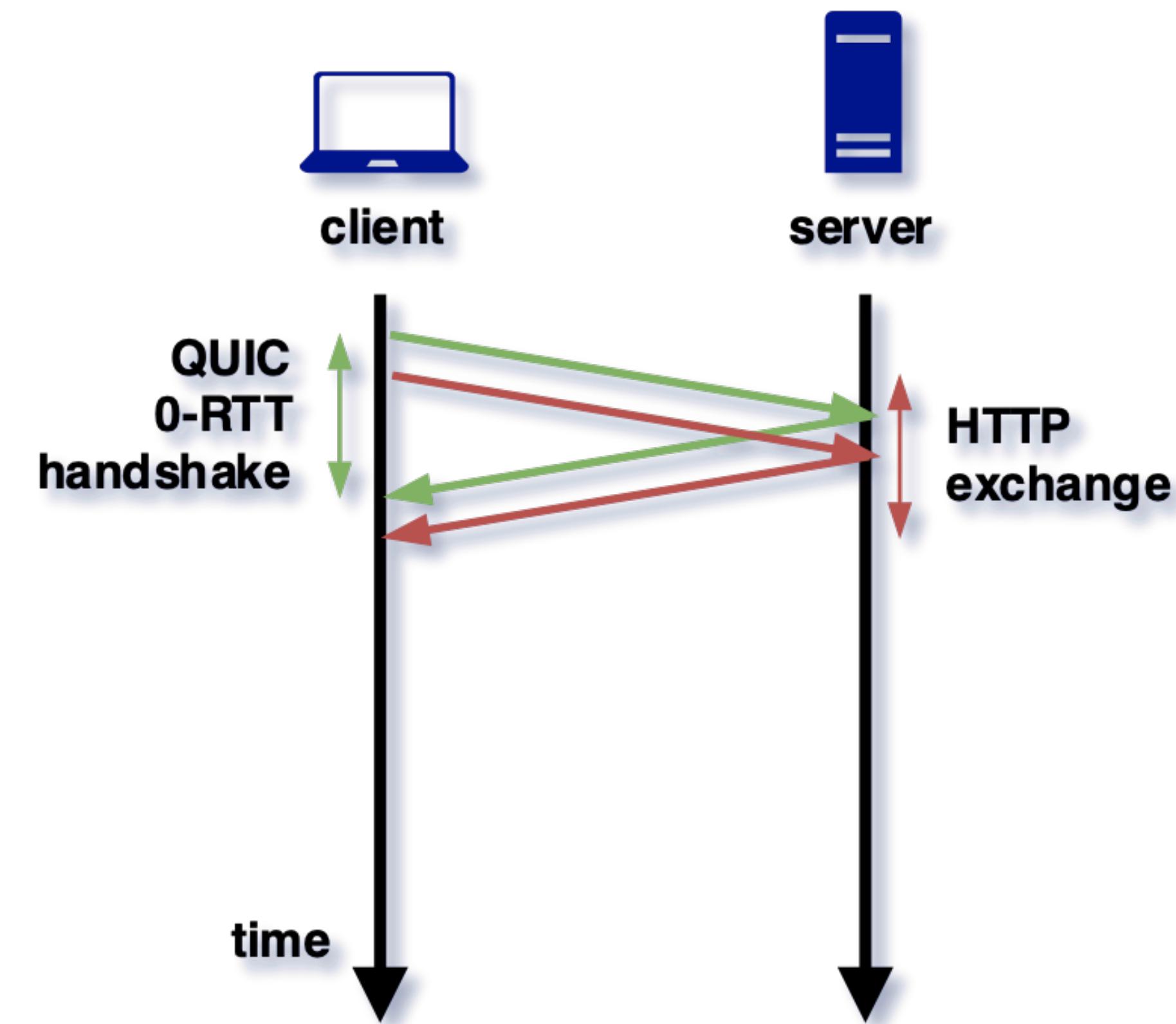
Connection handshake

1-RTT

HTTP over TCP + TLS

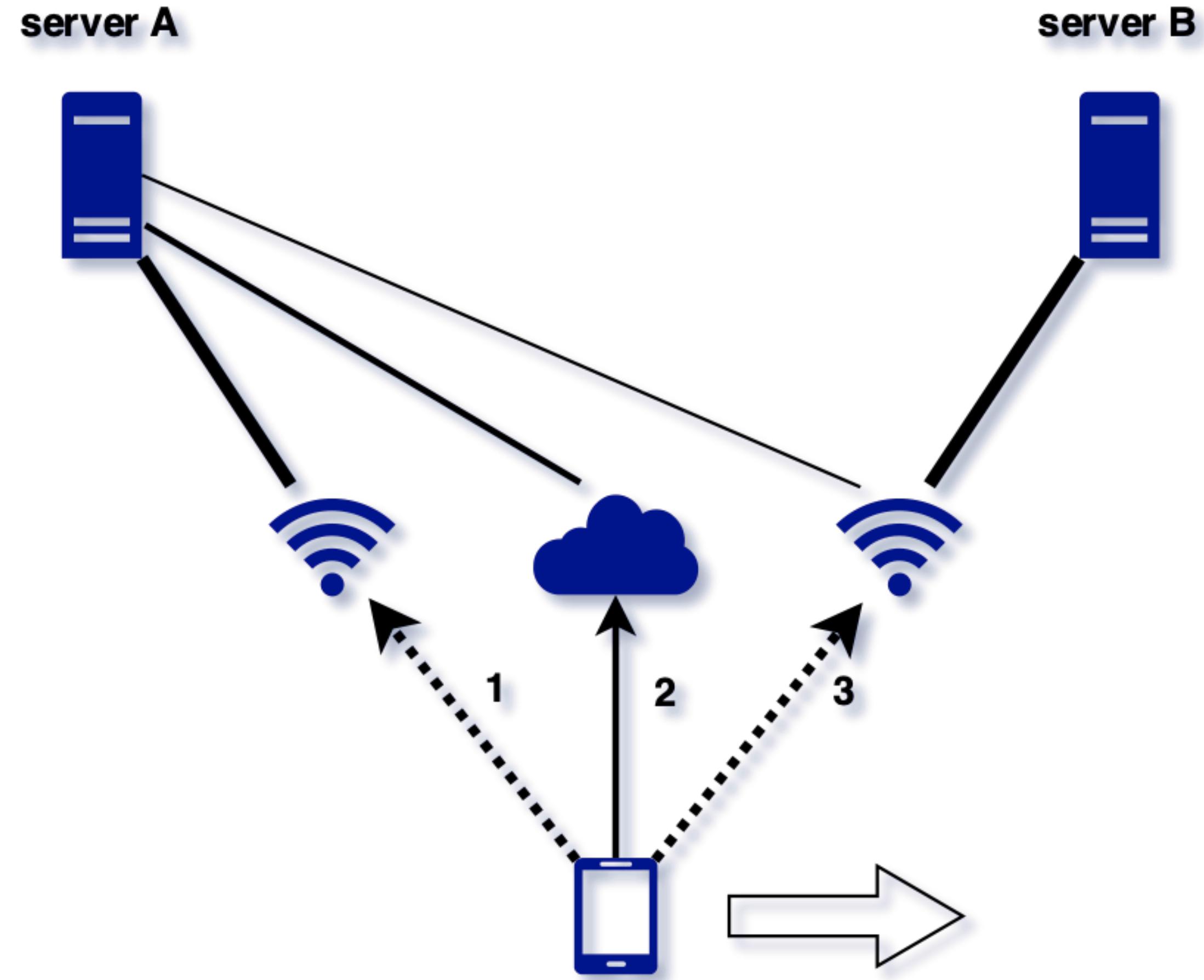


HTTP over QUIC



Reconnection handshake

0-RTT



Connection migration



Fully encrypted

Photo by Mauro Sbicego on Unsplash

Other advantages

- Faster development
- Prioritization changes
- More info for congestion control and loss recovery



Who wants to be ready?

Don't want to miss

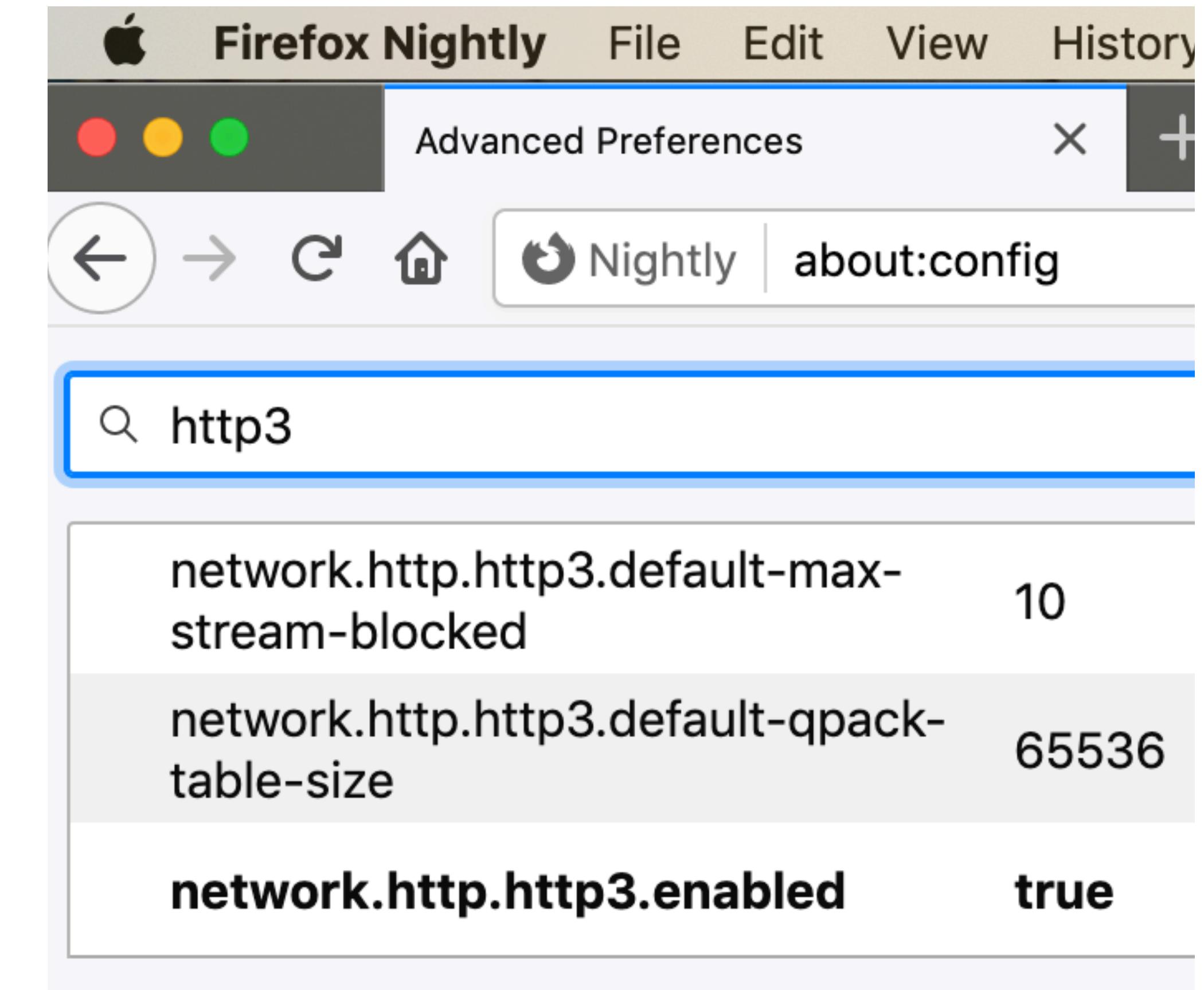


CLOUDFLARE®

Try HTTP/3 yourself

<https://ietf.akaquic.com>

<https://bagder.github.io/HTTP3-test/>



Resources

- Daniel Stenberg: HTTP/3 for everyone
<https://daniel.haxx.se/blog/2020/02/02/http-3-for-everyone/>
- Robin Marx: QUIC and HTTP/3 : Too big to fail?!
<https://calendar.perfplanet.com/2018/quic-and-http-3-too-big-to-fail/>
- QUIC Implementations
<https://github.com/quicwg/base-drafts/wiki/Implementations>

Who is ready for HTTP/3?

Miloslav Pojman
@MiloslavPojman

Hive Talks
February 25, 2020

<https://pojman.cz/2020/http3/>

