Chromium Status Update

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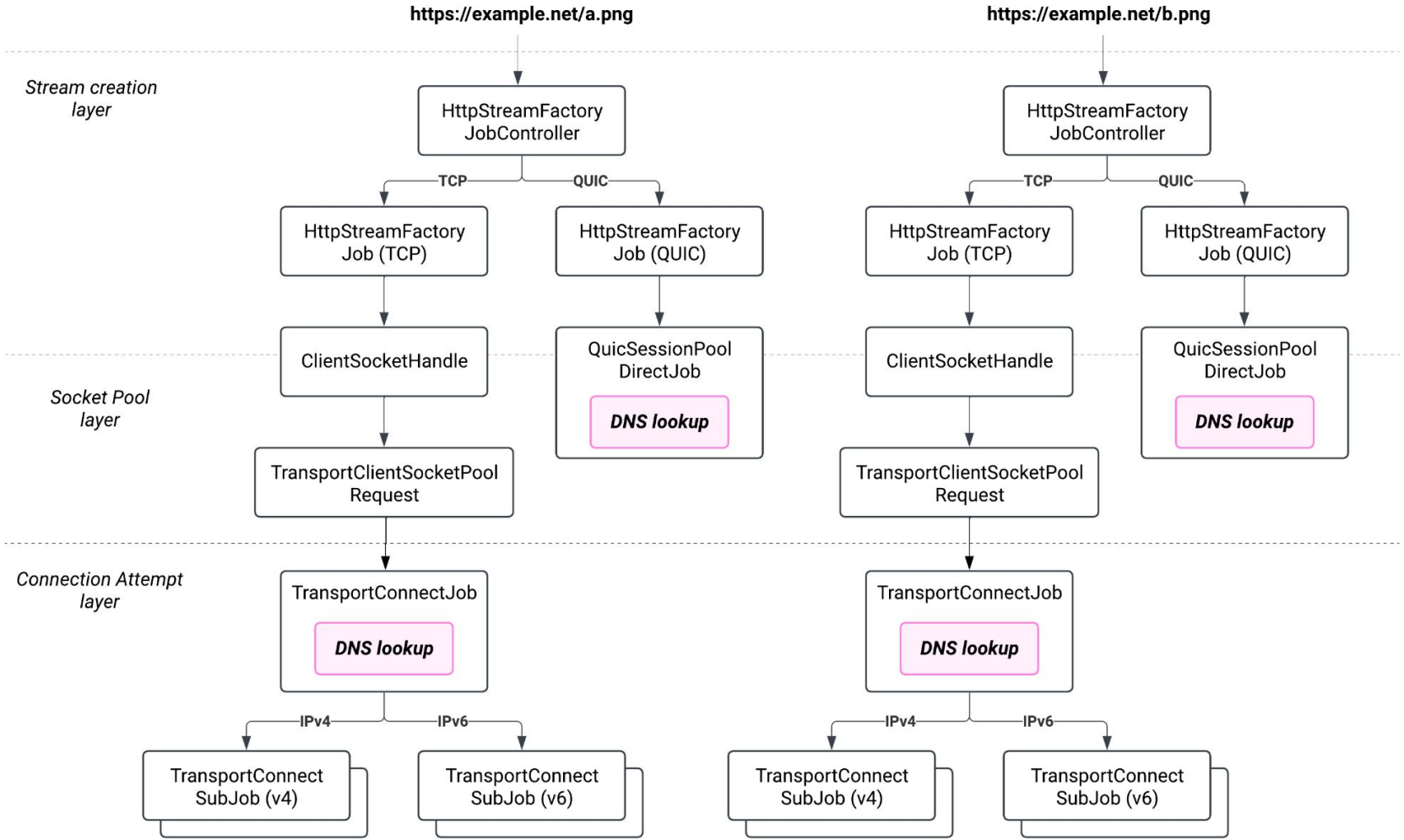
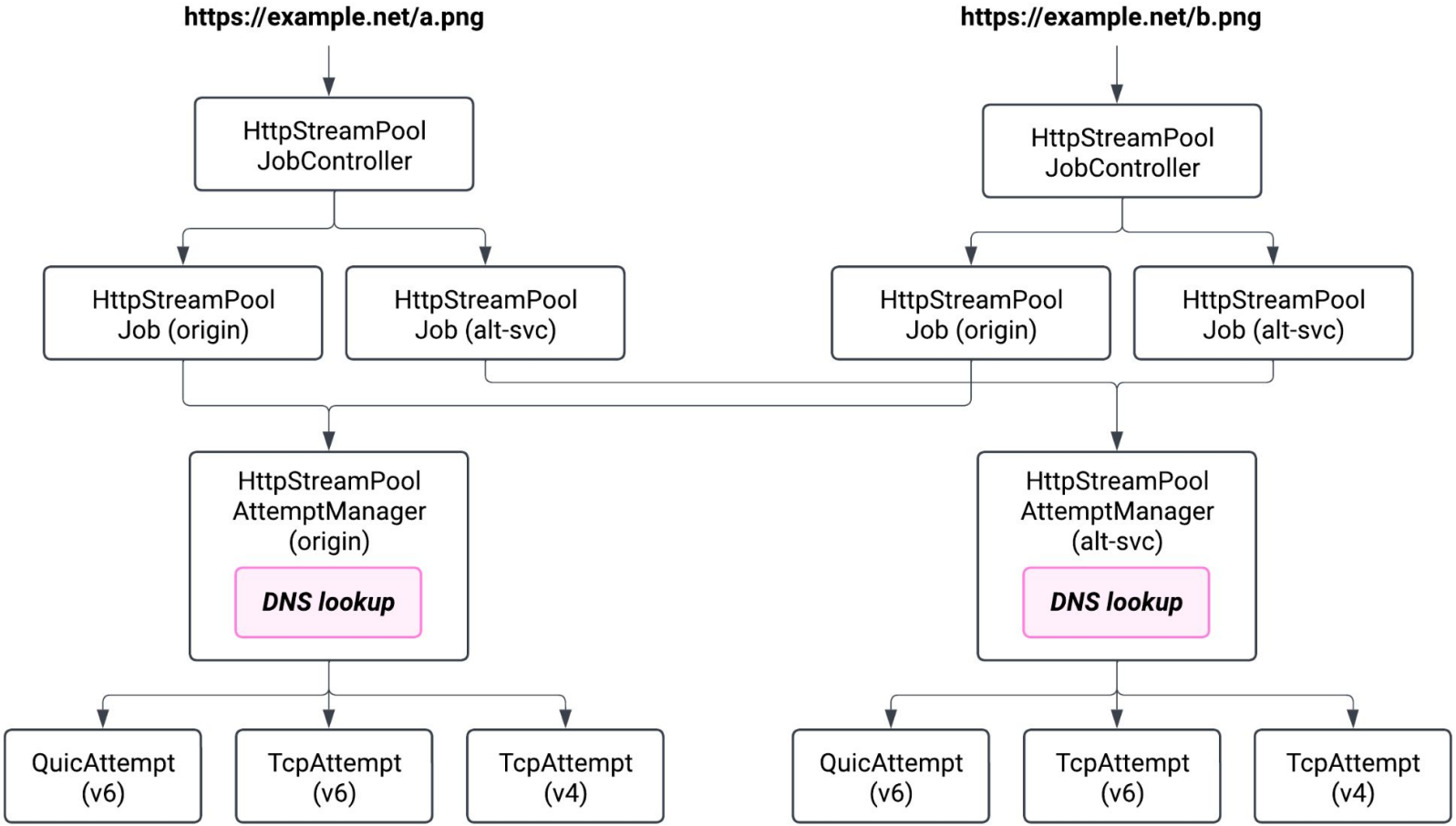
Status Quo: Only support HEv1 for TCP

- Separate code path for TCP and QUIC attempts
- Perform DNS resolutions separately for each TCP/QUIC attempt
  - Don't share the same DNS resolution instance among TCP/QUIC attempts
- Wait for all DNS responses (AAAA/A/HTTPS) before attempting a connection
  - Sort addresses based on RFC 6724
- A TCP attempt races IPv6 and IPv4 addresses
- A QUIC attempt only attempts a single IP address


https://example.net/a.png
https://example.net/b.png
Stream creation layer
Socket Pool layer
Connection Attempt layer
HttpStreamFactory JobController
TCP
QUIC
HttpStreamFactory Job (TCP)
HttpStreamFactory Job (QUIC)
ClientSocketHandle
QuicSessionPool DirectJob
DNS lookup
TransportClientSocketPool Request
TransportConnectJob
DNS lookup
IPv4
IPv6
TransportConnect SubJob (v4)
TransportConnect SubJob (v6)

Rework for HEv3

- Rewrite the connection attempt management logic
- Share DNS resolutions for TCP and QUIC attempts
- Attempt connections without waiting for all DNS responses


https://example.net/a.png
https://example.net/b.png
HttpStreamPool JobController
HttpStreamPool JobController
HttpStreamPool Job (origin)
HttpStreamPool Job (alt-svc)
HttpStreamPool Job (origin)
HttpStreamPool Job (alt-svc)
HttpStreamPool AttemptManager (origin)
DNS lookup
HttpStreamPool AttemptManager (alt-svc)
DNS lookup
QuicAttempt (v6)
TcpAttempt (v6)
TcpAttempt (v4)
QuicAttempt (v6)
TcpAttempt (v6)
TcpAttempt (v4)

Constraints on Starting Attempts

- Wait for HTTPS RR before initiating TLS/QUIC handshake for ECH
- Delays TCP-based attempts unless QUIC is known not to be supported
- Start TCP handshake once IPv6 addresses are available
- Start TCP handshake to IPv4 addresses after Connection Attempt Delay

Staggering Protocols and Address Families

Use a naive approach to decide which protocols/address families to attempt:

- Prefer IPv6 to IPv4
- Prefer HTTP/3 (QUIC) to TCP-based protocols (HTTP/1.1 and HTTP/2)

If an IPv6 attempt fails, switch the address family preference to IPv4. And vice versa if an IPv4 attempt fails.

Delay TCP-based attempts in favor of QUIC. The delay is calculated by the RTT known at that time.

We likely consider more sophisticated approach later.

Plans

- The development is still underway
- Plan to start an early field experiment on Canary and Dev channels soon