QUIC-Aware Proxying

draft-ietf-masque-quic-proxy-01

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Agenda

Protocol recap

Design Team encryption proposal

Loop issue

Protocol recap

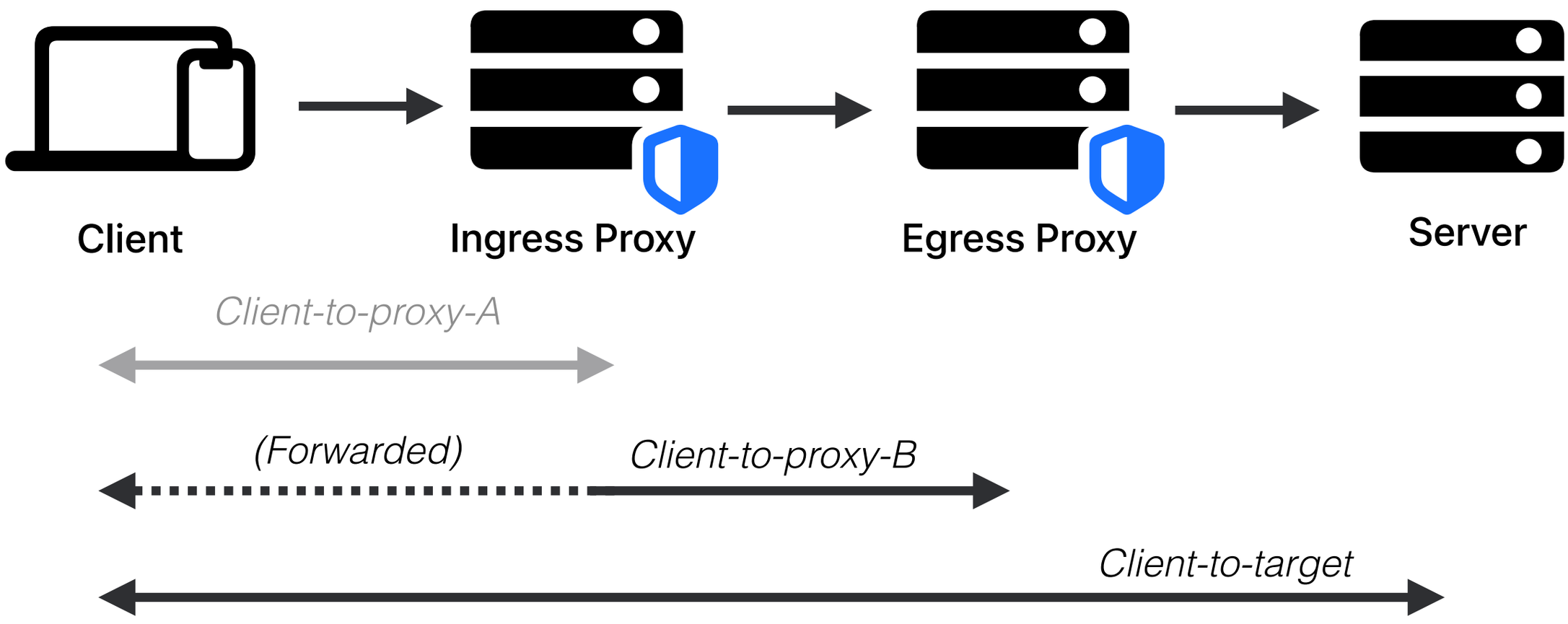
Client tells proxy about inner QUIC connection's CIDs (using capsules!)

Proxy may reuse target-facing ports

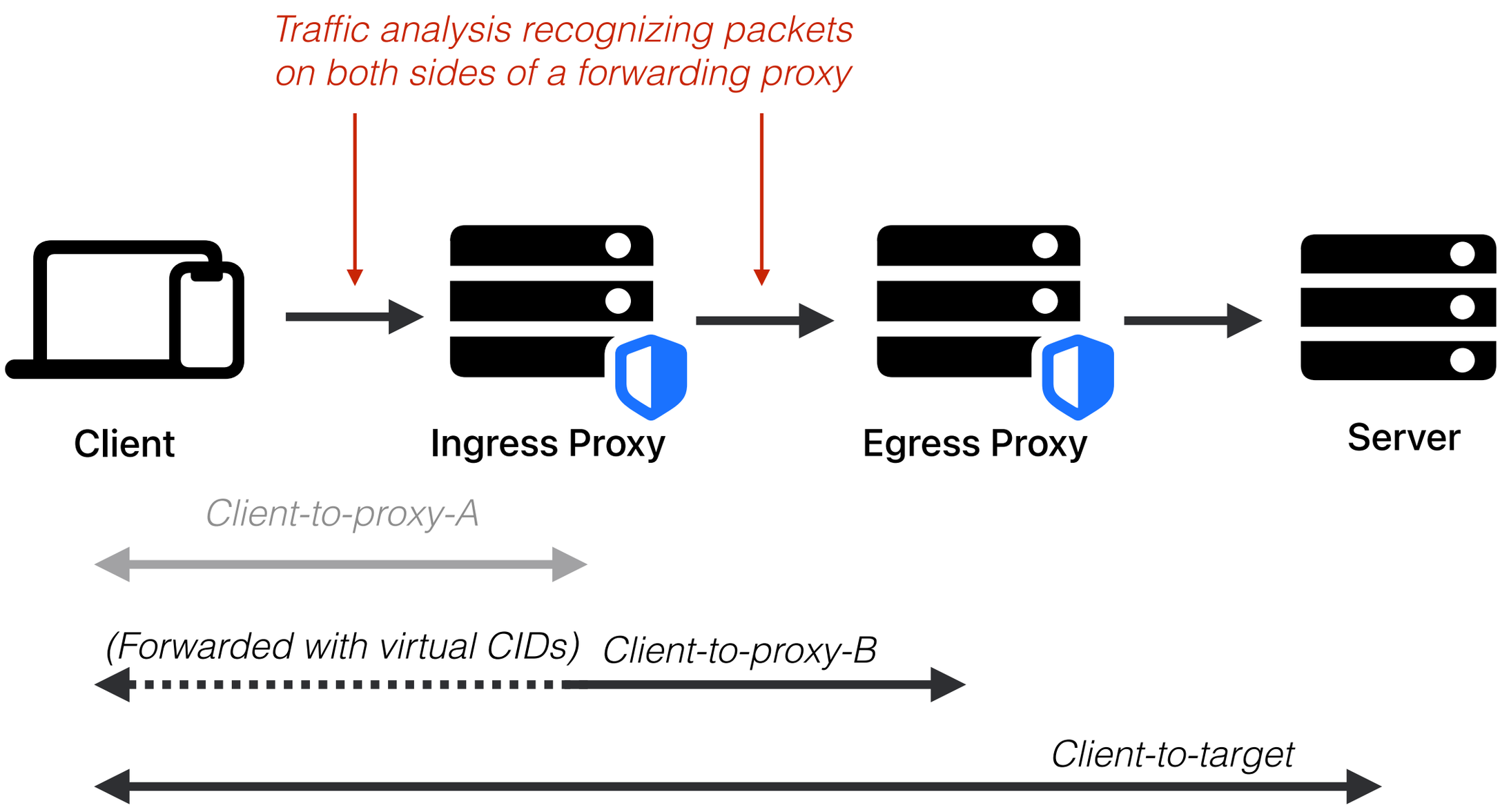
Client and proxy may skip encapsulation and encryption for proxied SH packets — avoiding cumulative MTU overhead issues

Forwarded mode packets on the wire use virtual CIDs instead of the inner connection's real CIDs

Protocol recap



Need for encryption



Design team proposal

PR #99

Goal: **analyze the threat of traffic analysis** on forwarded mode, and **propose a mechanism for adding encryption** to forwarded mode

Design team proposal

PR #99

Proposed solution:

- Add "packet transforms" for forwarded mode
- Define the "scramble" transform, using AES-128 block ciphers
- Prevents passive byte recognition attacks; like tunneling, does not prevent passive timing attacks or active injection/corruption attacks

Design team proposal

PR #99

```
STREAM(44): HEADERS                  --------->
  :method = CONNECT
  :protocol = connect-udp
  :scheme = https
  :path = /target.example.com/443/
  :authority = proxy.example.org
  proxy-quic-forwarding = ?1; accept-transform=scramble,null; \
      scramble-key=:abc...789=:
  capsule-protocol = ?1

                                ...

                     <---------  STREAM(44): HEADERS
                                   :status = 200
                                   proxy-quic-forwarding = ?1; \
                                       transform=scramble; \
                                       scramble-key=:ABC...321=:
                                   capsule-protocol = ?1
```

Design team proposal

PR #99

The base proposal does not cover transforms to add padding or chaff packets to avoid timing attacks

- Techniques to prevent timing attacks would need to be analyzed and designed even for tunneled mode

- New transforms can be defined to handle work in this area

Design team proposal

PR #99

Next steps

- Renaming "null" transform to "identity"
- Are we ready to merge the PR and close the design team?

Open issue: CID loops

Issue #88

Clients can create forwarding loops if:

- Proxy shares a client-facing IP (VIP) with other proxies; and
- Proxy reuses target-facing sockets for multiple tunnels; and
- Client picks Virtual Client Connection ID

Open issue: CID loops

Issue #88

- Prohibiting VIP sharing is incompatible with some deployments
- Eliminating target-facing port sharing may necessitate additional target-facing IPs for sufficient port space
- Proxy-chosen Virtual Client CIDs require clients to receive QUIC packets with CIDs it doesn't generate. May affect ability to demultiplex. Complicates capsule exchange. (PR#104)

Proxy-chosen Virtual Client CIDs

PR #104

Client		Proxy
REGISTER_CLIENT_CID ->		
		<- ACK_CLIENT_CID (Virtual Client CID)
ACK_CLIENT_VCID ->		
REGISTER_TARGET_CID ->		
		<- ACK_TARGET_CID (Virtual Target CID)