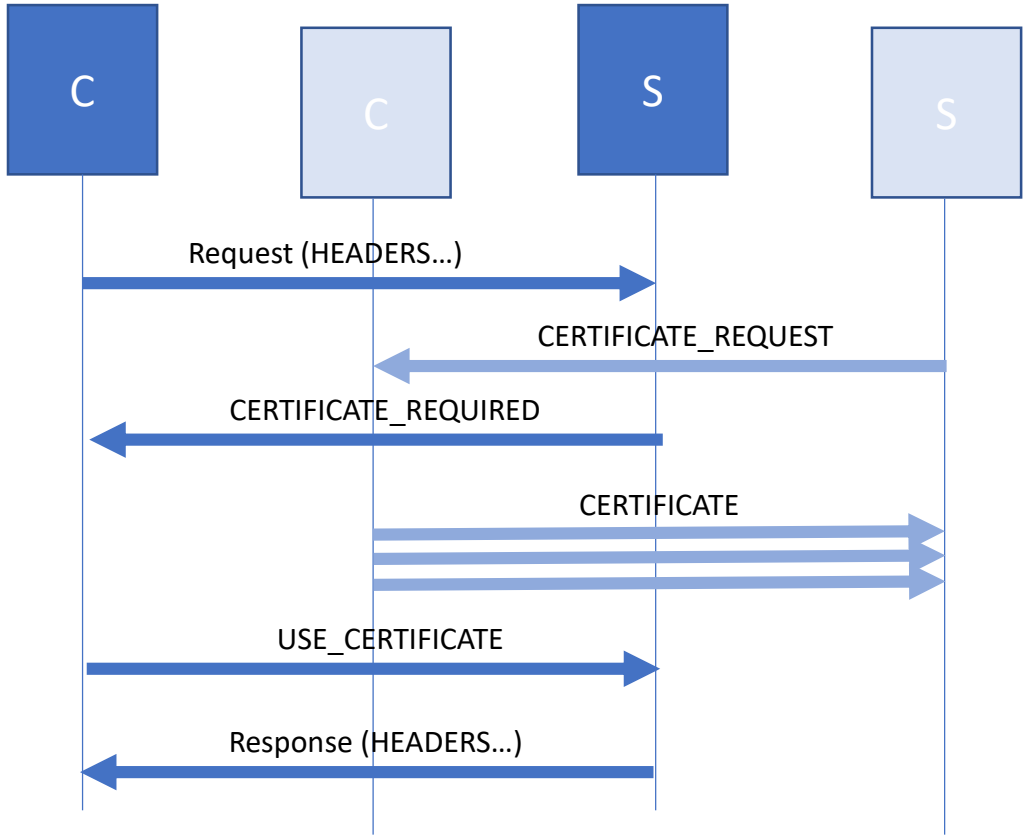
Secondary Certificates

IETF 102 – Montréal

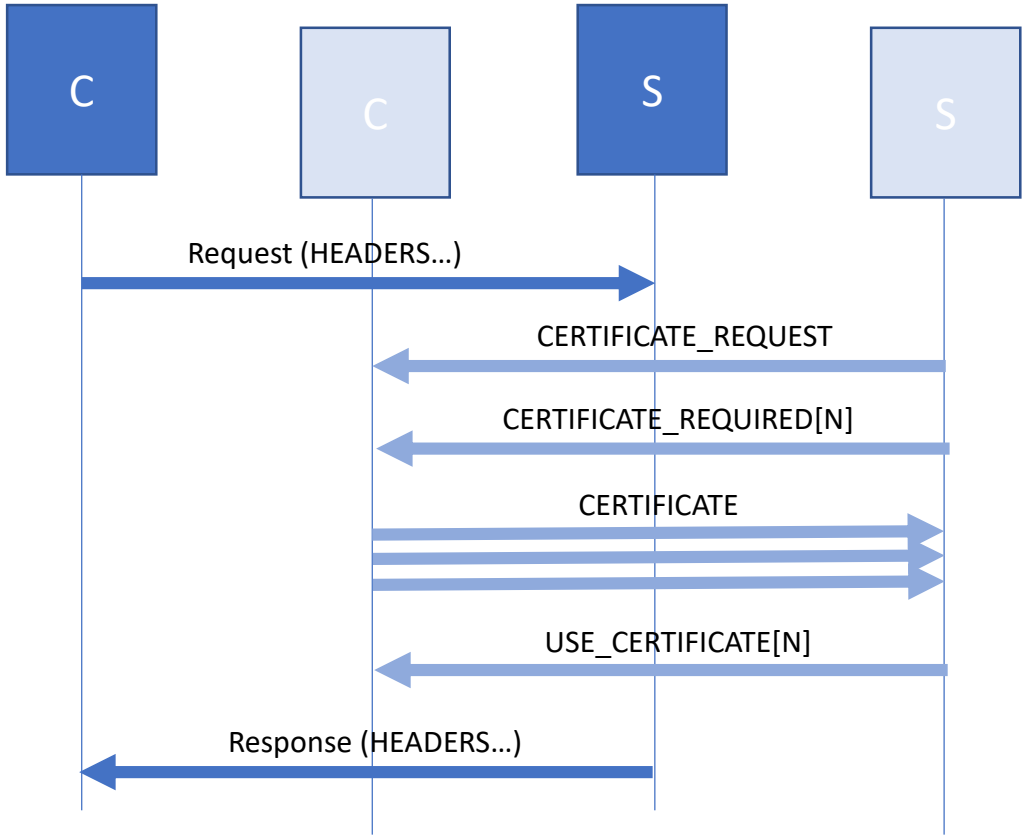

Since London….

Everything on Control Stream

Draft 00



Draft 01



More explicit

Draft 00

- CERTIFICATE contained flag for AUTOMATIC_USE
  - Servers MAY consider this certificate for any request the client makes
  - If challenged, client doesn't know whether server already tried that certificate
- Servers MUST set AUTOMATIC_USE on all certificates

Draft 01

- USE_CERTIFICATE contains flag for UNSOLICITED
  - Indicates that server hasn't asked for a certificate, but client is offering one just in case
  - If server challenges for certificate, client knows the proffered one didn't work
- If you want certificate used on every request, send USE_CERTIFICATE with every request

More explicit

Draft 01

Clients probe for certificates by sending CERTIFICATE_NEEDED for an idle stream

- …because the stream will be used for a request to that origin
- …and the request can’t proceed until the client sees the cert

Draft 02

Clients probe for certificates by sending CERTIFICATE_NEEDED for stream 0

- …because the server certificate is a property of the connection

More delegation to TLS

Draft 00

- CERTIFICATE_REQUEST carries OID filters to describe desired cert
- CERTIFICATE carries cert chain
- CERTIFICATE_PROOF carries signature proving possession of cert
- USE_CERTIFICATE without Cert-ID refuses request

More delegation to TLS

Draft 00

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Draft 01

- CERTIFICATE_REQUEST carries Exported Authenticator Request
- CERTIFICATE carries Exported Authenticator
  - Includes cert chain + proof
- ~~CERTIFICATE_PROOF~~
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More delegation to TLS

Draft 00

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Draft 02

- CERTIFICATE_REQUEST carries Exported Authenticator Request
- CERTIFICATE carries Exported Authenticator
- Exported Authenticator with empty cert chain refuses request

Mitigate MitM

Draft 01

SETTING_HTTP_CERT_AUTH: 1

SETTING_HTTP_CERT_AUTH: 1

CERTIFICATE:

(Exported Authenticator)

Invalid!

Draft 02

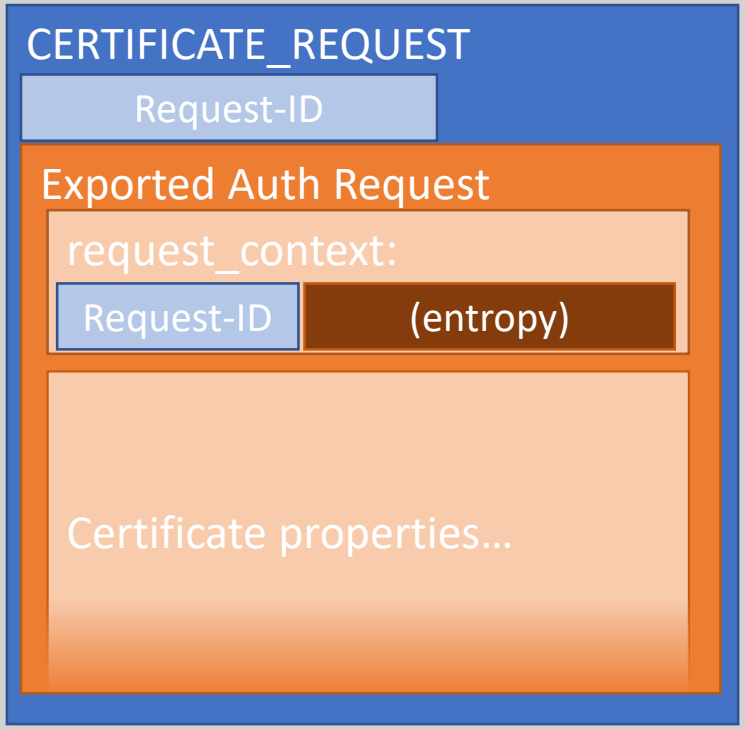
SETTING_HTTP_CERT_AUTH:

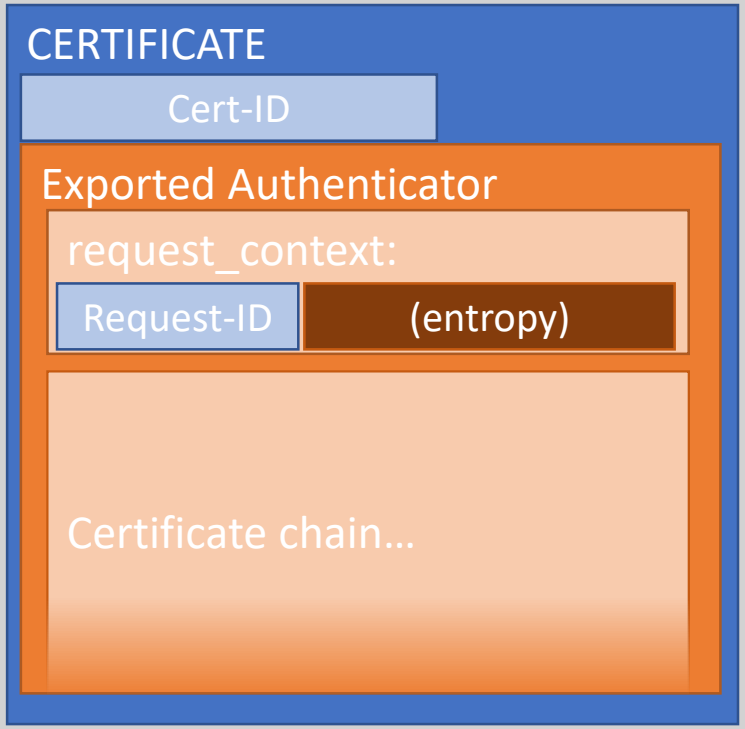
(TLS Exporter)

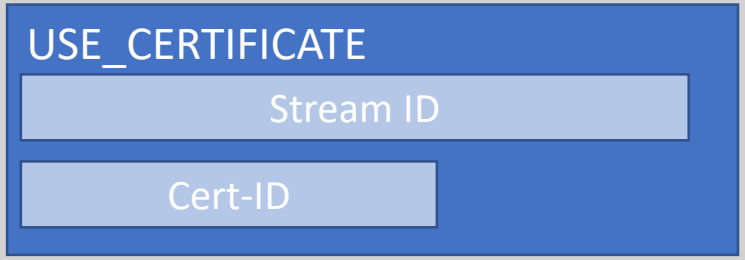
Invalid!

Open Issues

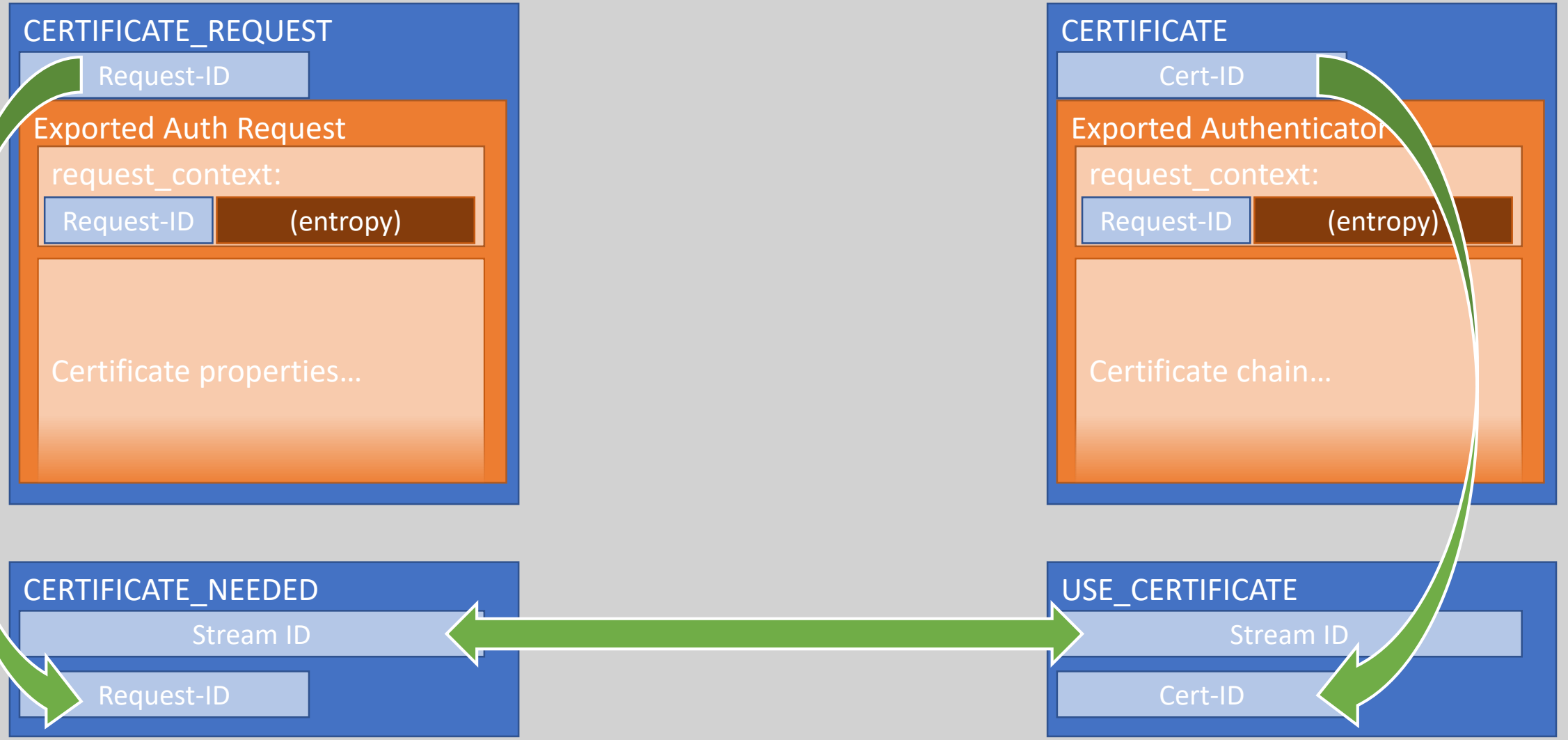
Binding of Frame Types



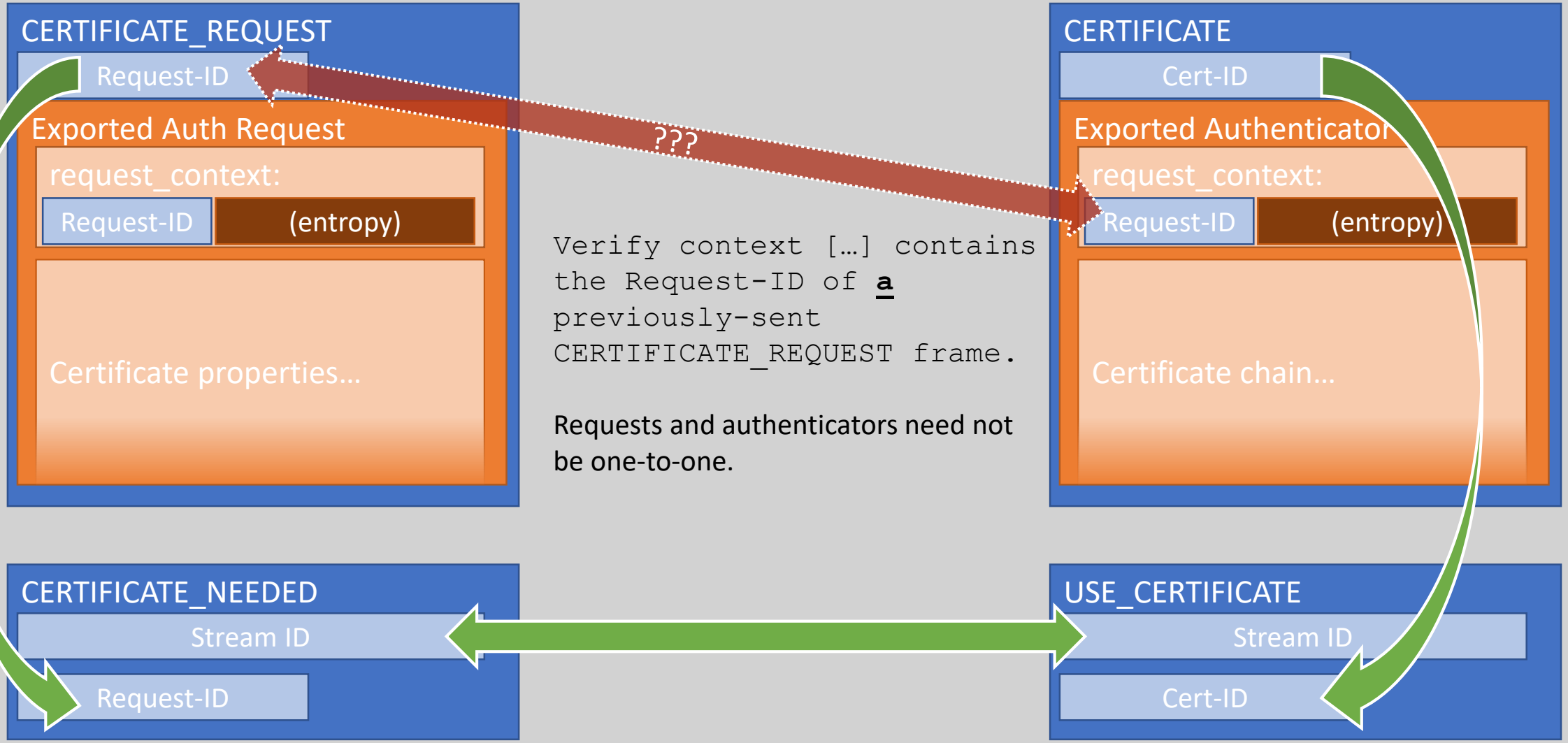




Binding of Frame Types



Binding of Frame Types



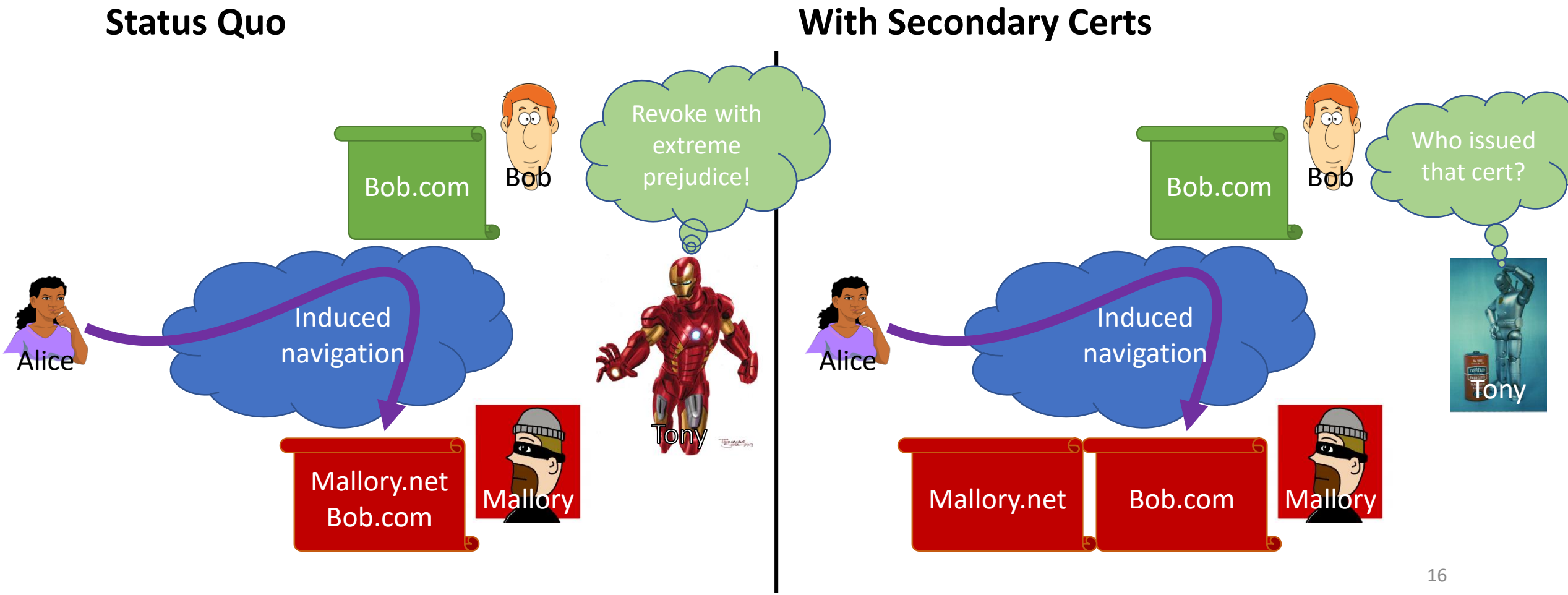
Questions

- Should cross-responses be permitted in the first place?
  - “You asked for a certificate for ‘example.com’ and a certificate for ‘images.example.com’ – this certificate covers both.”

- Should the CERTIFICATE frame explicitly contain the Request-ID of the CERTIFICATE_REQUEST?
  - Can be retrieved from the Exported Authenticator
  - Parity with CERTIFICATE_REQUEST structure

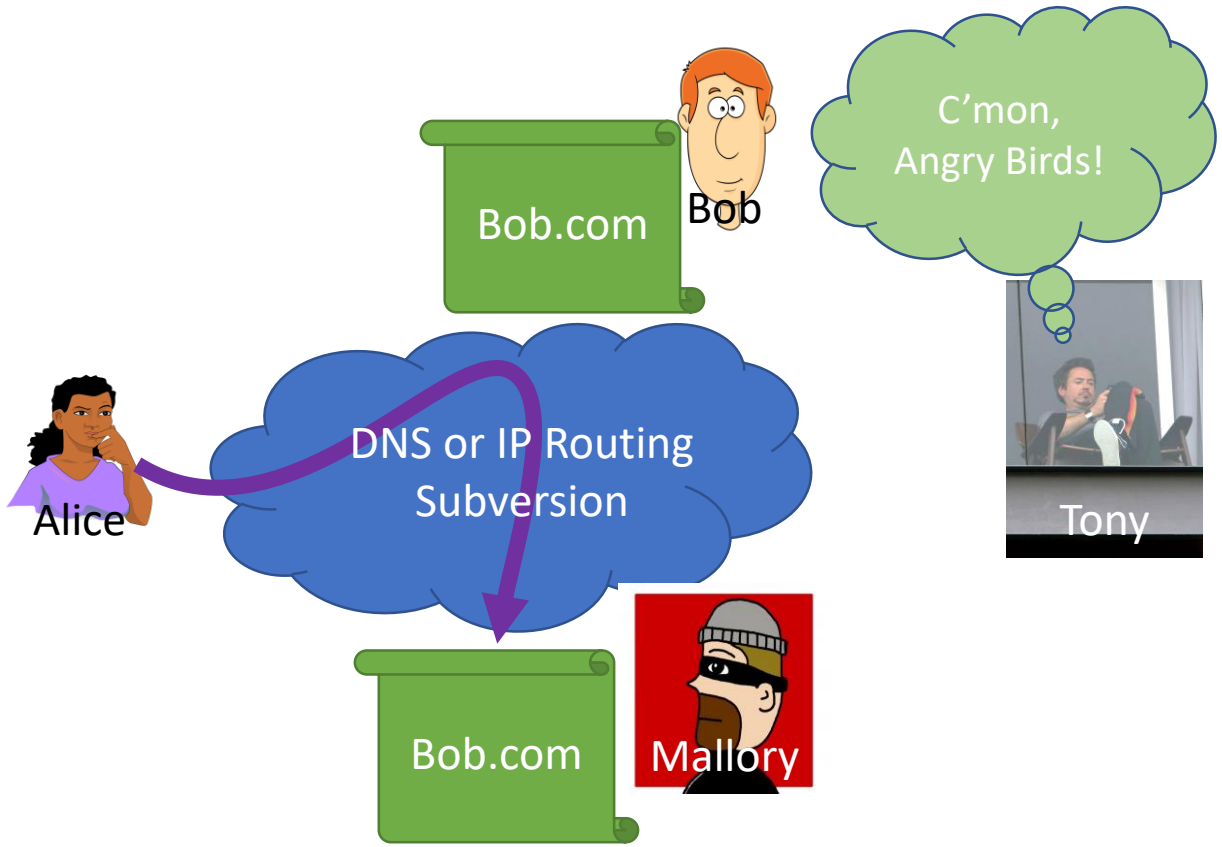
The Fly in the Ointment

Misissued Certificates

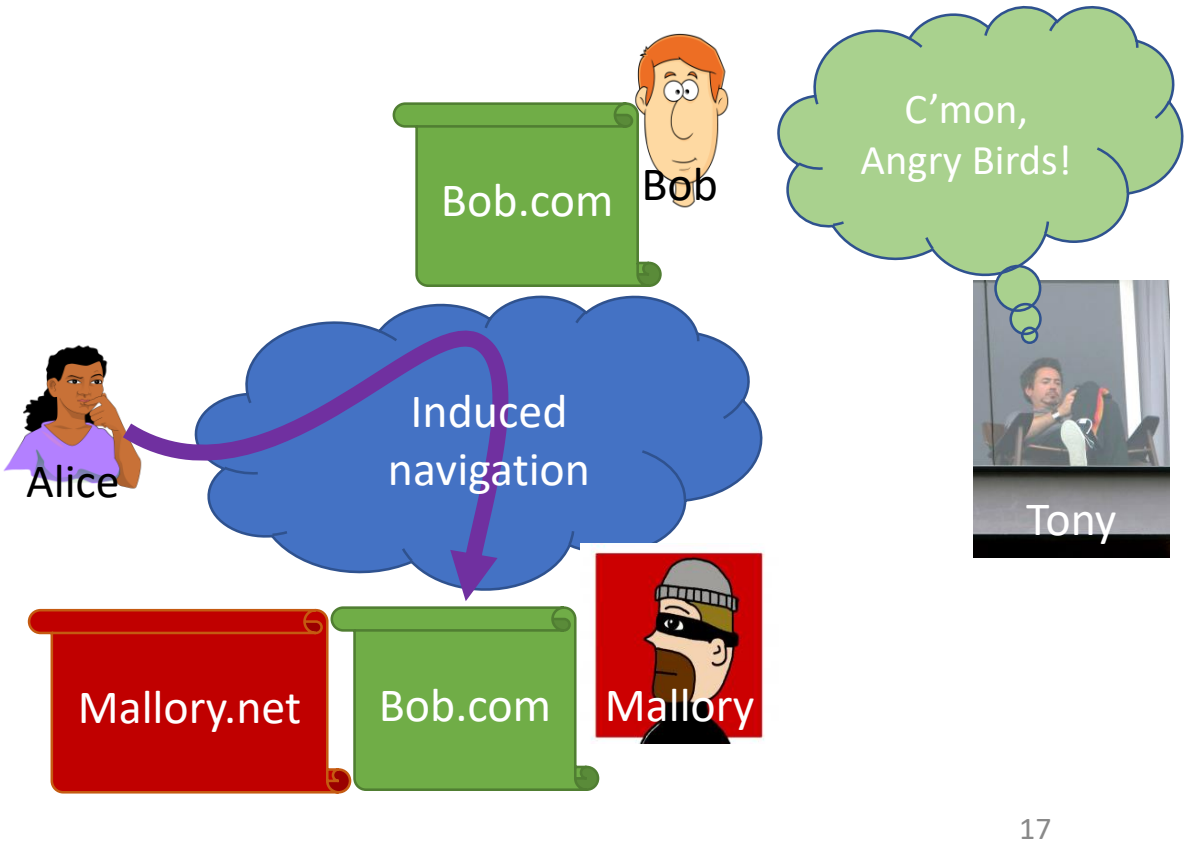


Key Compromise

Status Quo



With Secondary Certs



Path forward?

Permit Normal Certificates

- Misissued certificates are harder to trace
  - Attacker's domain doesn't need to be included
- Compromised certificates are easier to use
  - Attacker doesn't need to hijack the TCP connection, just get you to browse his site

Require New Certificate Properties

- Existing certificates not useful with Secondary Certs
  - Slows deployment once feature supported
- If the property makes the certificate "less secure," would anyone do it?

Proposal: Pin to Primary Domain(s)

- Define new certificate extension
  - Required for server certificates to be used with Secondary Certificates
  - Indicates which primary domains (from TLS handshake) the certificate can be used with
    - Could be wildcard
- Reject server certificates that don't include the extension
  - …or that are used under a different primary certificate
- Do we need something for client certs?