H2

CLIENT CERTS

PROBLEM

WE'VE DONE THIS BEFORE

HTTP/2 prevents servers from using client certificate authentication

except in narrow cases

HTTP requires reactive client authentication

ABORTIVE ATTEMPTS

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Use renegotiation in TLS 1.2/spontaneous auth in TLS 1.3

- Microsoft have a proprietary setting for renegotiation
- Hard to correlate certificates (and requests for same) with request
- Confused deputy problem

Solution: hoist all the machinery into HTTP/2

CERTIFICATE PROOFS

CERTIFICATE TABLE

CERTIFICATE_REQUEST (from server)

=> CERTIFICATE* + CERTIFICATE_PROOF (from client)

Substantially similar to TLS CertificateRequest, Certificate, CertificateVerify

Uses a TLS exporter to get the signature input

All happens on stream 0

Allows certificates to be added to the connection and later referenced many times (up to 256 certs, that is)

REQUEST BINDING

TABLE LOOKUP

A server can indicate that it wants a certificate to complete a request

CERTIFICATE_REQUIRED

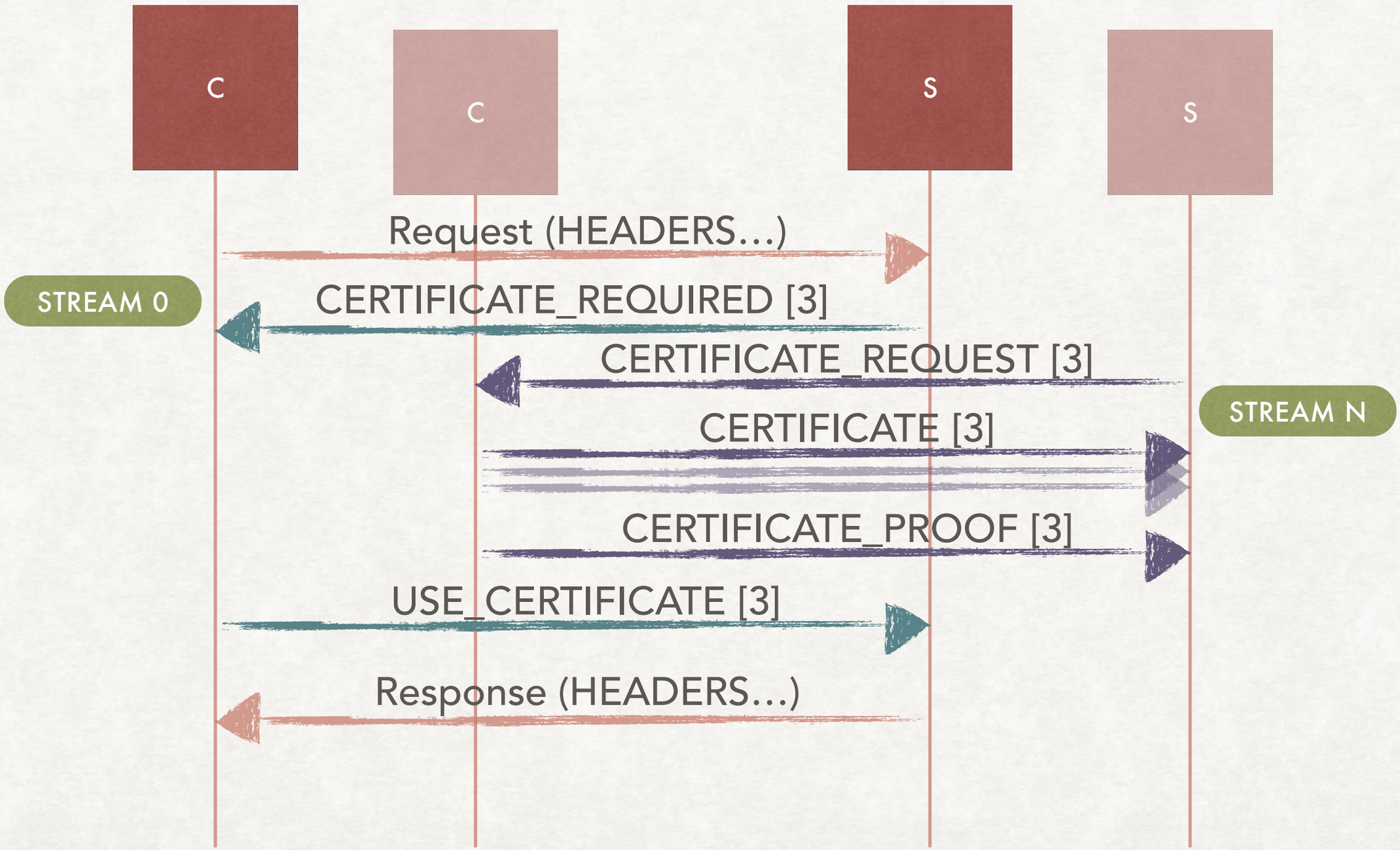
A client indicates that it wants to use a certificate

USE_CERTIFICATE

An empty frame indicates that the request is denied

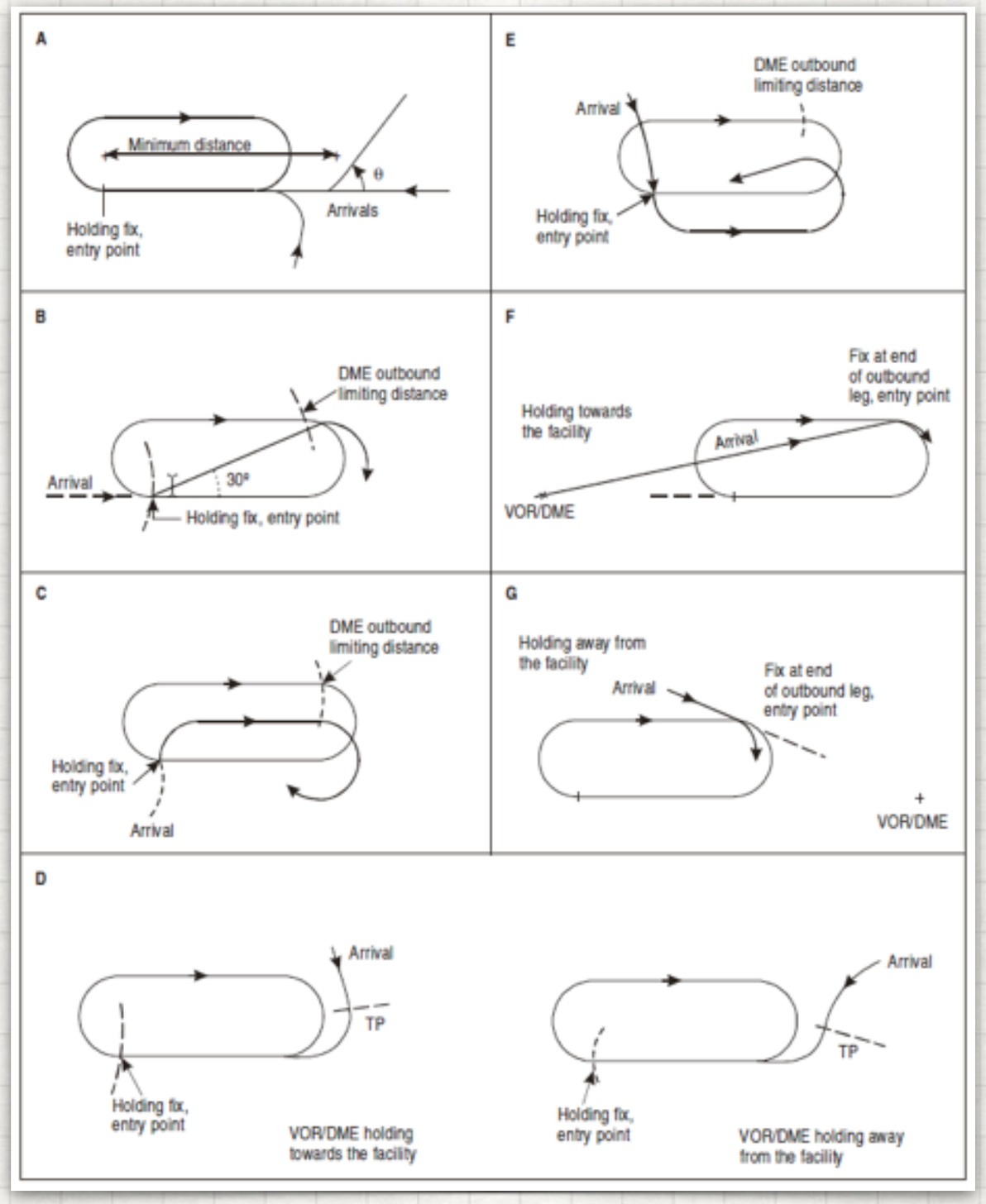
FLOW

EXAMPLE



...

NEXT STEPS


A
Minimum distance
θ
Arrivals
Holding fix, entry point
E
DME outbound limiting distance
Arrival
Holding fix, entry point
B
DME outbound limiting distance
Arrival
30°
Holding fix, entry point
F
Fix at end of outbound leg, entry point
Holding towards the facility
Arrival
VOR/DME
C
DME outbound limiting distance
Holding fix, entry point
Arrival
G
Holding away from the facility
Arrival
Fix at end of outbound leg, entry point
+
VOR/DME
D
Arrival
TP
Holding fix, entry point
VOR/DME holding towards the facility
Arrival
TP
Holding fix, entry point
VOR/DME holding away from the facility