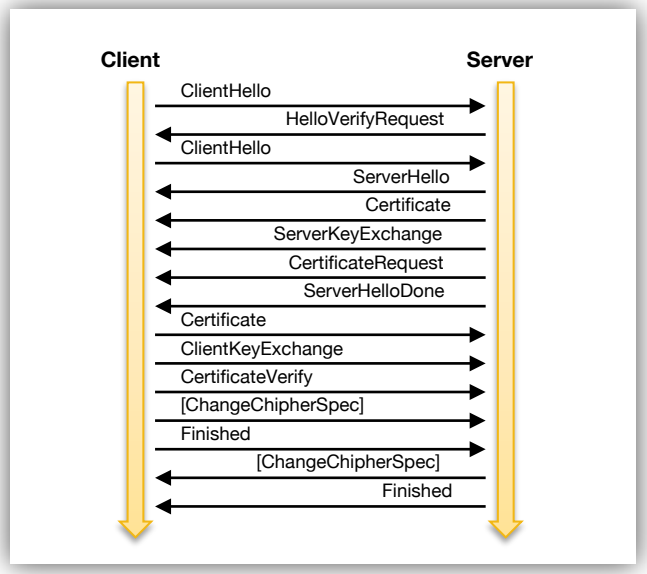
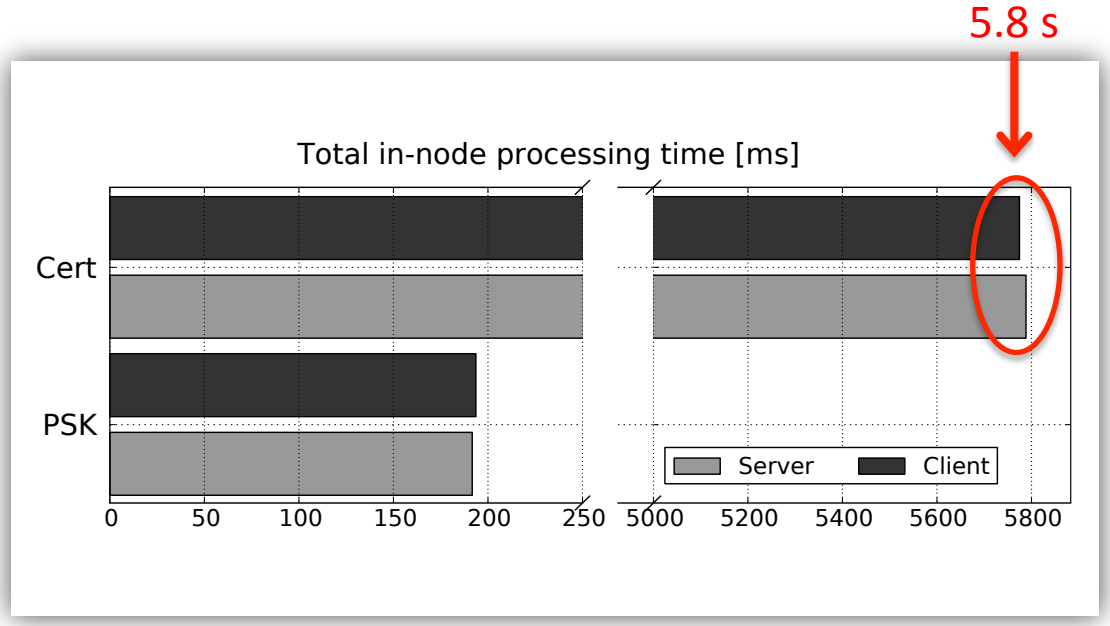
draft-hummen-dtls-extended-session-resumption-01

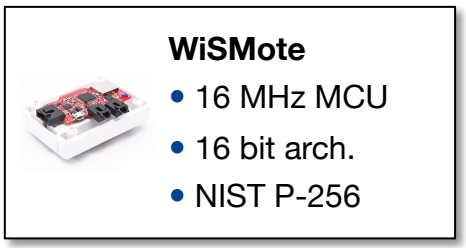
René Hummen, Johannes Gilger, Hossein Shafagh
RWTH Aachen University
ETH Zurich

Runtime Overhead of Full Handshake

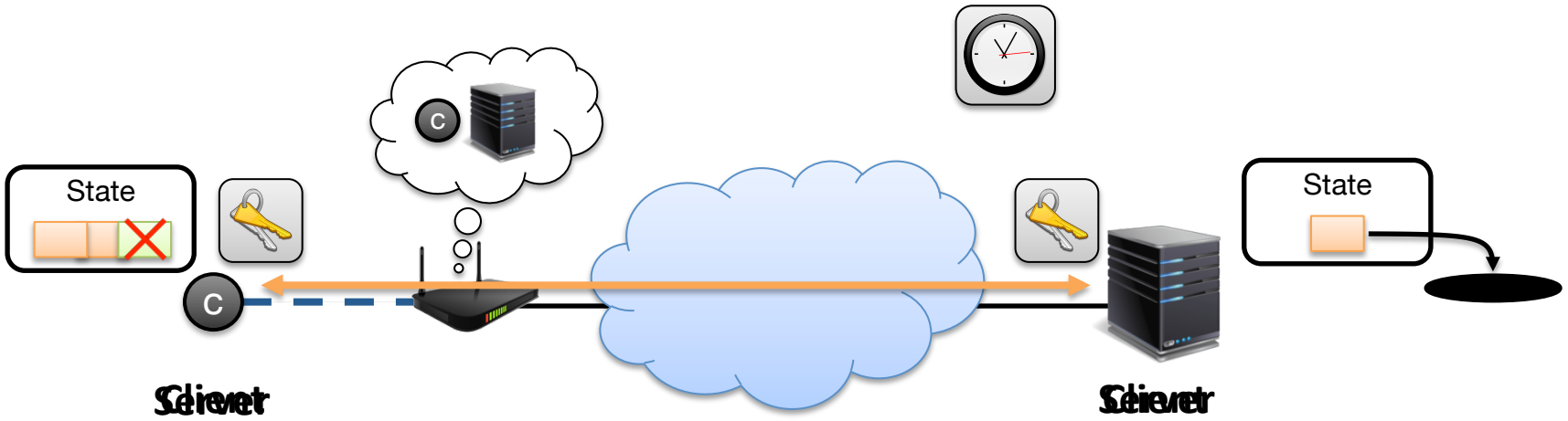




- Lengthy message exchange
- High computation cost

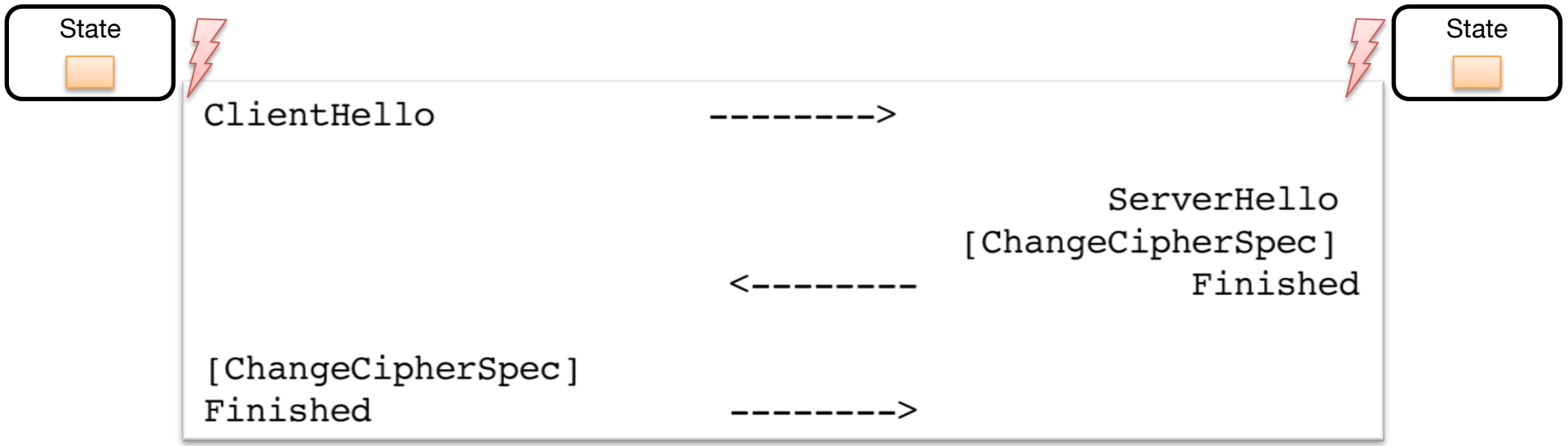


Never Close Session



- Potential issues
  1. Heartbeats [RFC 6520] (e.g., stateful FW [RFC 6092])
  2. Short-lived server sessions (e.g., large-scale services)
  3. Constrained server (e.g., CoAP server)

Abbreviated Handshake



- DTLS 1.2 base specification [RFC 6347]
  - Re-use session state from previous session
    - Indicated by non-zero SessionID in ClientHello
  - No up-front agreement to use abbreviated handshake
  - Constrained devices may unnecessarily store state

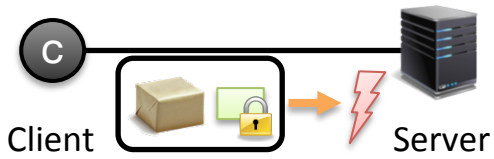
Session Resumption without Server-Side State

Full handshake

```
ClientHello
(empty SessionTicket extension)-------->
                                        ServerHello
                                 (empty SessionTicket extension)
                                        Certificate*
                                  ServerKeyExchange*
                                  CertificateRequest*
                          <--------     ServerHelloDone
Certificate*
ClientKeyExchange
CertificateVerify*
[ChangeCipherSpec]
Finished                  -------->
                                      NewSessionTicket
                                      [ChangeCipherSpec]
                          <--------           Finished
Application Data          <-------->  Application Data
```

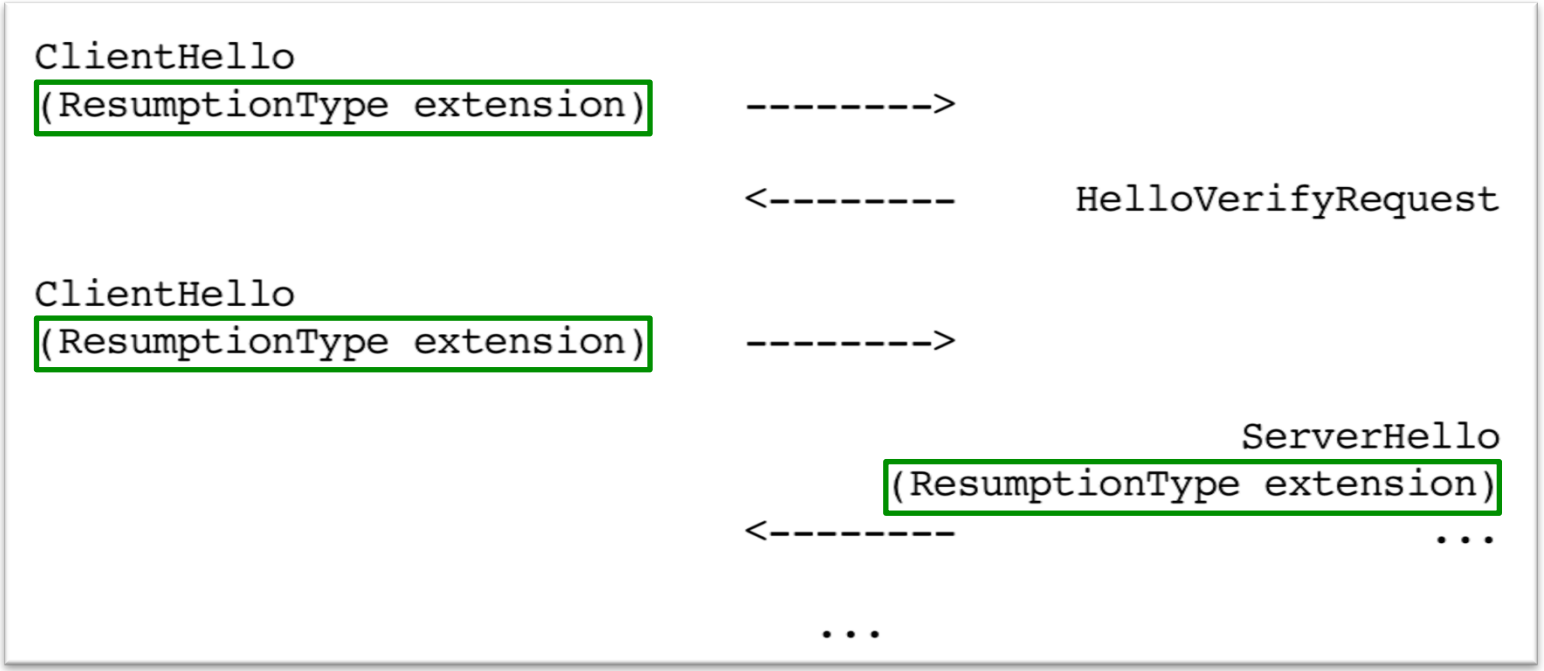
Abbreviated handshake

```
ClientHello
(SessionTicket extension)   -------->
                                        ServerHello
                                 (empty SessionTicket extension)
                                      NewSessionTicket
                                      [ChangeCipherSpec]
                          <--------           Finished
[ChangeCipherSpec]
Finished                  -------->
Application Data          <-------->  Application Data
```



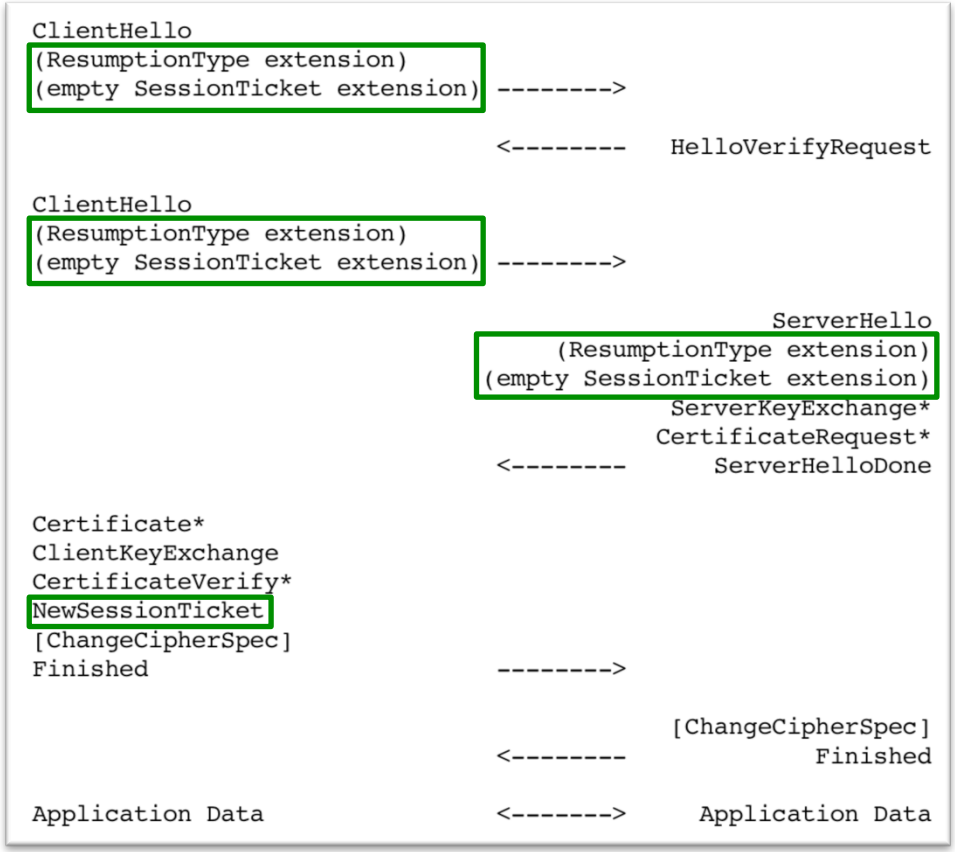
- TLS extension [RFC 5077]
  - Enable one peer to remain stateless while session inactive
  - Limited to (D)TLS server->client state offloading
  - Constrained (D)TLS client scenario not considered

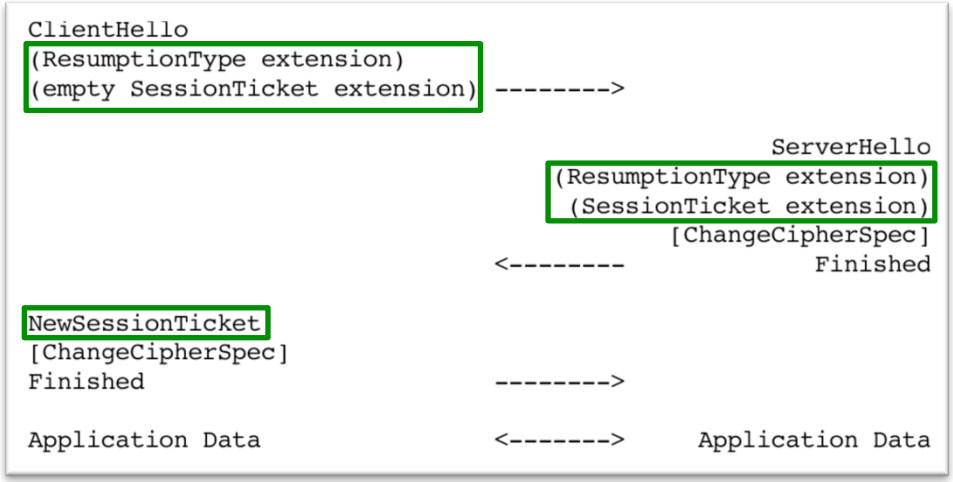
Session Resumption Type Negotiation



- Enable **explicit** type agreement
- Session state only stored when agreed upon

Session Resumption without Client-Side State





- Signaling strongly based on RFC 5077
  - SessionTicket Extension
  - NewSessionTicket Message

Ticket Construction Recommendations

- Most recommendations in RFC 5077 apply
- Changes needed for…
  - Cipher suite for ticket protection (→ AES CCM)
  - ClientAuthenticationType

```
struct {
 ClientAuthenticationType client_authentication_type;
 select (ClientAuthenticationType) {
 case anonymous: struct {};
 case certificate_based: ASN.1Cert certificate_list<0..2^24-1>;
 case psk: opaque psk_identity<0..2^16-1>;
} ClientIdentity;
```

Status and Next Steps

- Status quo
  - Signaling (mostly) done
  - Proof of concept implementation done
- ToDos
  - Extend on ticket construction
    - Allow to check certificate status
- Questions
  - Draft considered useful?
  - How and where to proceed?