TCP-ENO: Encryption Negotiation Option

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November 4, 2015

IETF 93 (and 92, and…)

- Do we do tcpcrypt? Do we do TLS? Do we do TCP AO-Encryption? Do we do tcpcrypt? Do we do TLS? Do we do tcpcrypt? …

- What's clear:

  - Need a mechanism to signal encryption support.

  - Security requirements: Session ID for application-level authentication, forward secrecy, etc.

  - Provide fixed target for APIs across encryption specs.

TCP ENO: a framework for bootstrapping security protocols

SYN, ENO(tcpcrypt, TLS, X)

Do you support tcpcrypt? TLS? X?

(plain) SYN ACK

plain-text connection

Or:

SYN-ACK, ENO(tcpcrypt)

encrypted connection

Architecture: three layers

ENO

Negotiate *encryption spec*

ENO transcript

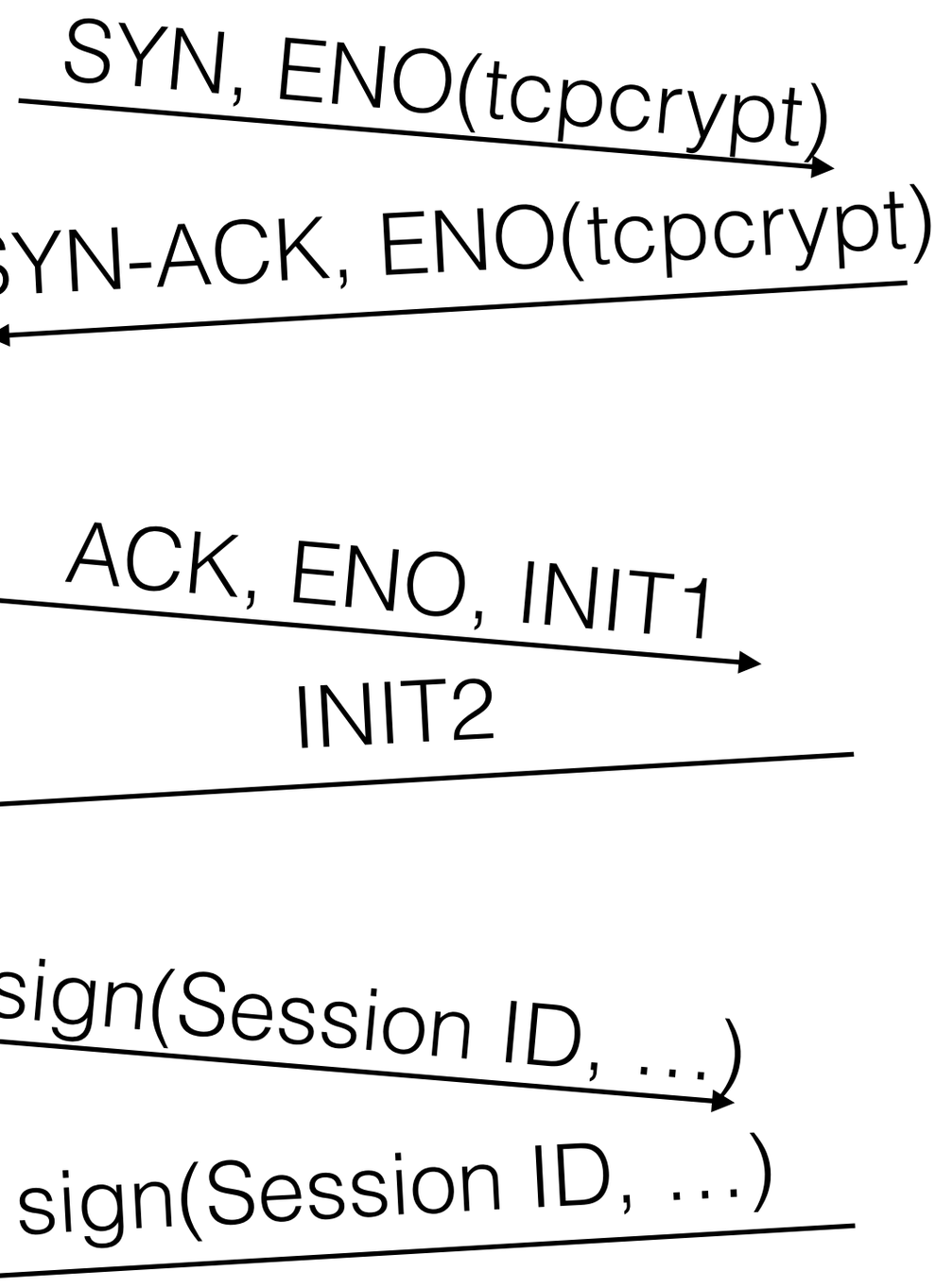
Encryption spec (e.g., tcpcrypt)

Setup and perform encryption.

Session ID

Application (optional)

perform authentication



TCP ENO: a framework for bootstrapping security protocols

SYN-ENO

Encryption: Does the kernel support tcpcrypt (or TLS, or X)?

Authentication: Does the application support ENO?

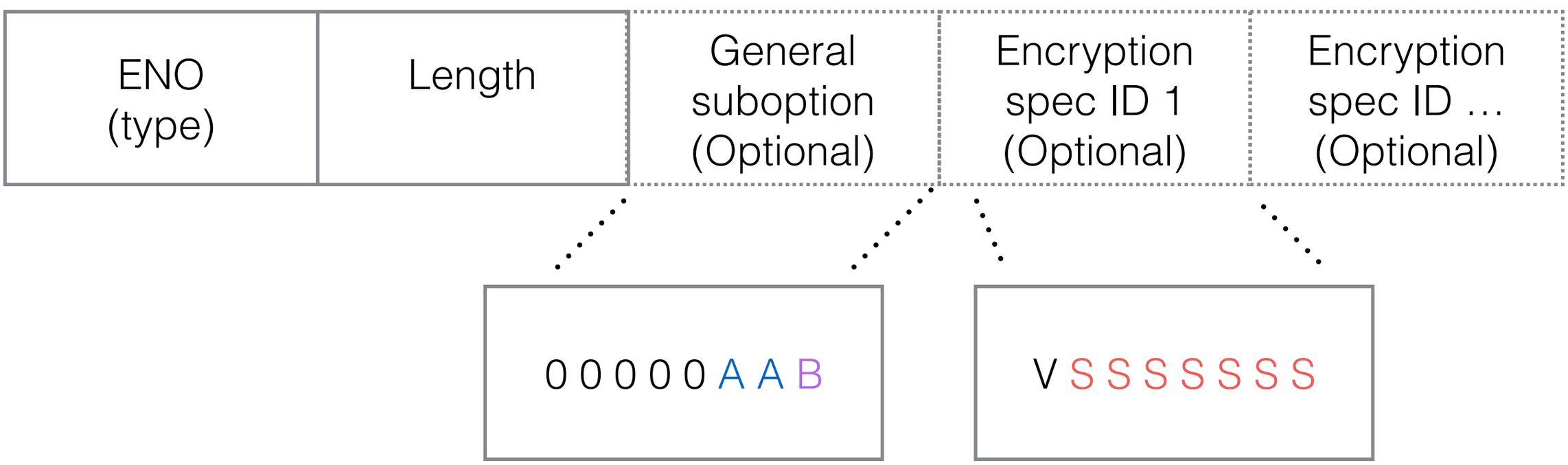
Disable ENO if the application doesn't support it?

(plain) SYN ACK - plain-text

ENO SYN ACK - authenticated encryption

ENO (app-support) SYN ACK - auth. encryption and app-awareness

TCP ENO option



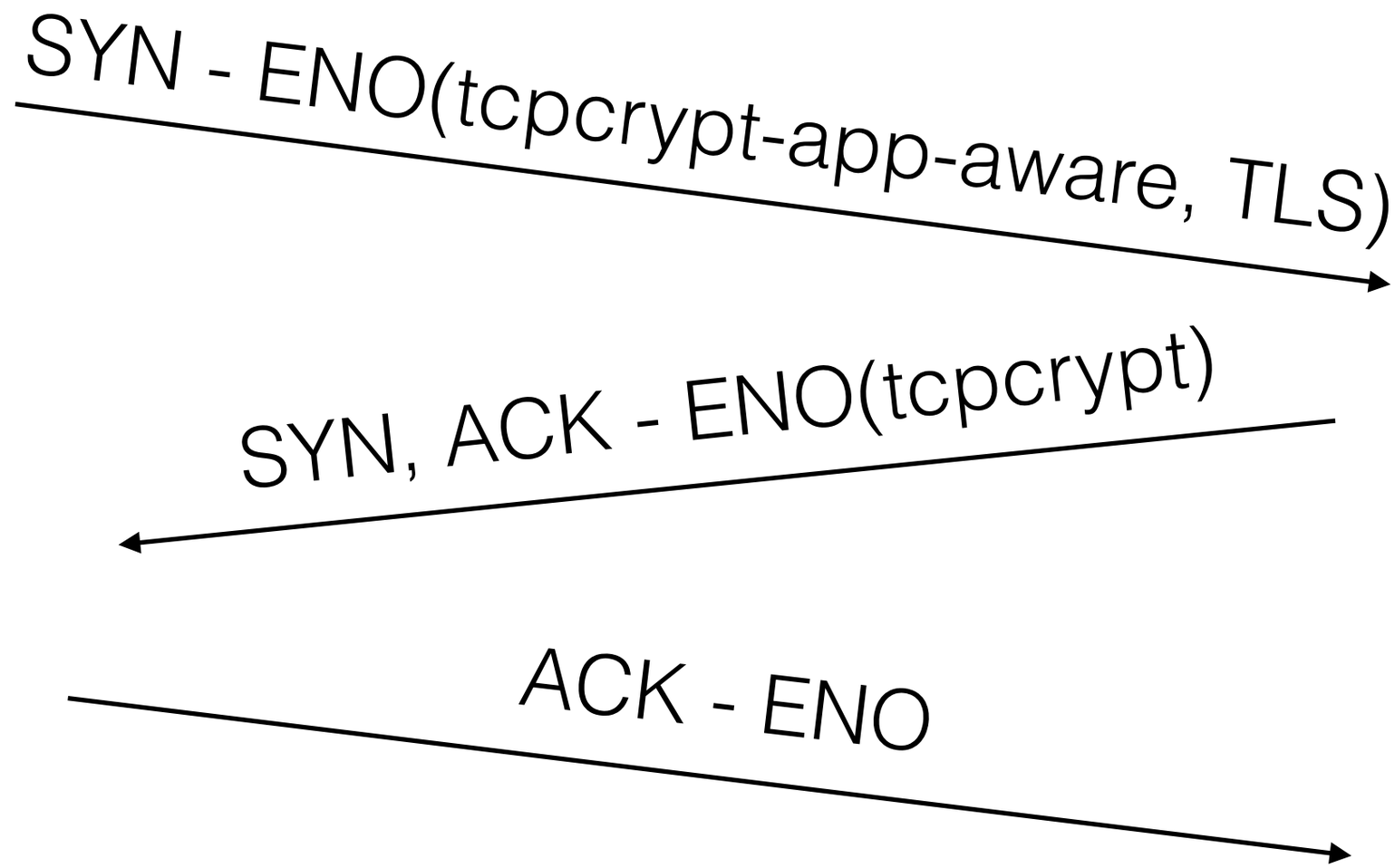
A: 2 application aware bits (aware, mandatory)

B: simultaneous open tie-breaker

V: 1 if suboption spans multiple bytes (must be last)

S: 7 bits to specify encryption protocol ID

ENO handshake



Output: ENO transcript - concatenation of all ENO SYN options, separated by empty ENO options.

Abstracting TCP-level encryption for applications

- Expose a Session ID.
  - First byte must be spec ID. Min 33 bytes total.
  - Must depend on fresh data from both client and sever, depend on public DH parameters, and ENO transcript.
  - Must not be confidential and must be random.
- Authenticated encryption.
- Forward secrecy.
- Protect end-of-file marker (FIN).

Open Issues

- Address mailing list feedback (M. Scharf).
  - Make option kind sharing non-normative.
- Is current support for simultaneous open adequate?
- Extractors for quantities other than Session ID?