Implicit IV for Counter-based Ciphers in IPsec

DRAFT-MGLT-IPSECME-IMPLICIT-IV

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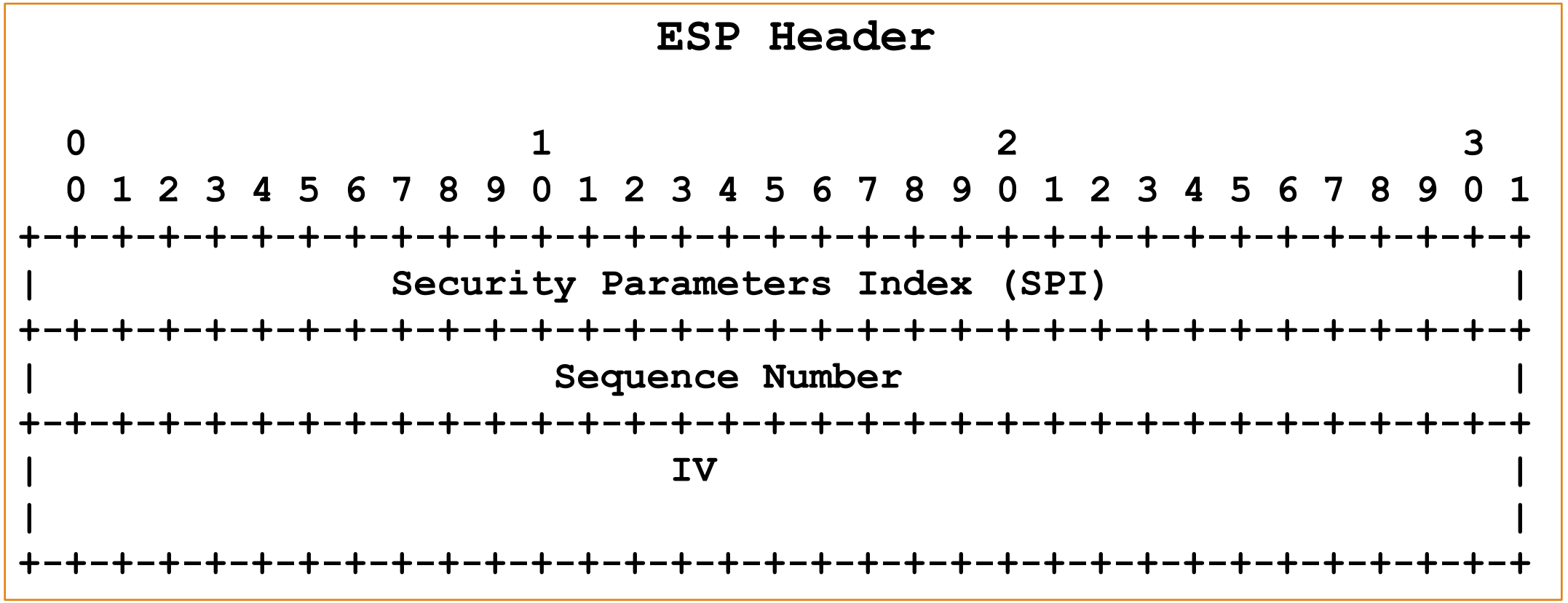
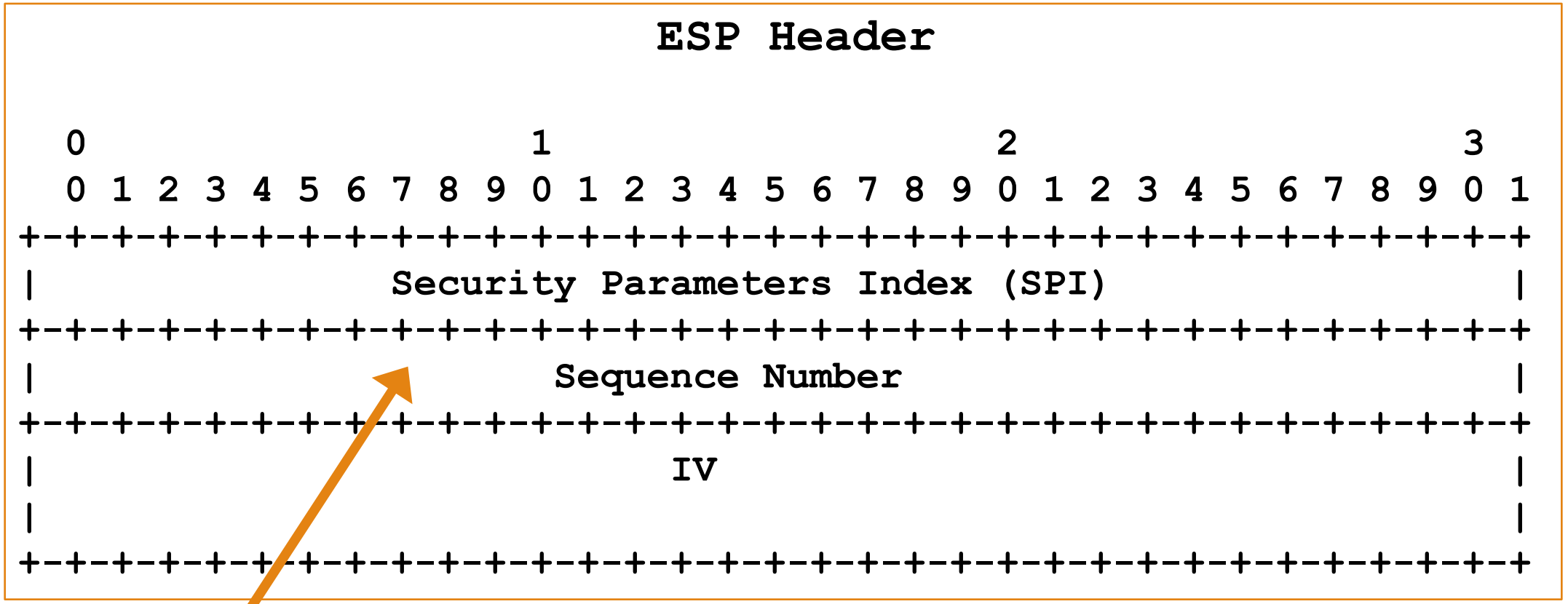
Why?

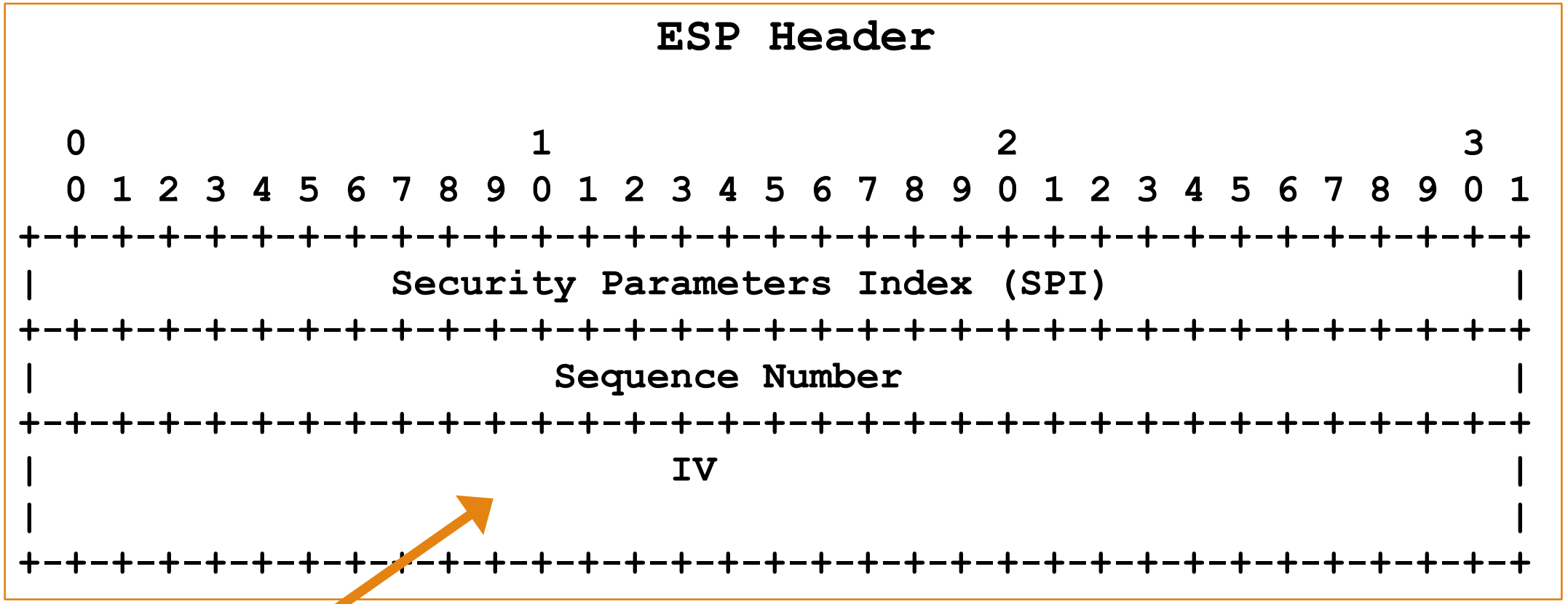
- Counter-based algorithms and AEADs are becoming more popular: AES-GCM, AES-CCM, ChaCha20.
- Unlike CBC-based algorithms, these do not benefit from unpredictable IVs. In fact, the specifications for all of these recommend using a guaranteed unique IV, specifically a counter as the recommended method of setting this IV.

ESP Header


0 1 2 3
0 1 2 3 4 5 6 7 8 9 0 1 2 3 4 5 6 7 8 9 0 1 2 3 4 5 6 7 8 9 0 1
Security Parameters Index (SPI)
Sequence Number
IV



This is a packet sequence number


ESP Header
0 1 2 3
0 1 2 3 4 5 6 7 8 9 0 1 2 3 4 5 6 7 8 9 0 1 2 3 4 5 6 7 8 9 0 1
Security Parameters Index (SPI)
Sequence Number
IV

So is this

Implicit IV

- If we follow the recommendations, those two counters will be equal.
- So why do we need to repeat the same counter in two different fields?
- We don’t.
- If both sides agree, we can just omit the IV.
- It’s optional anyway.
- Saves 8 bytes per packet.

Negotiating Implicit IV

- Options:
  - New Transform Type
    - ENCR, INTEG, PFS, ESN, and now: IIV
  - New Transform Attribute
    - Key Length. Now also IIV
  - New Transform ID
    - Already have AES-GCM_16; now also AES-GCM_16_IIV
  - New Notification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