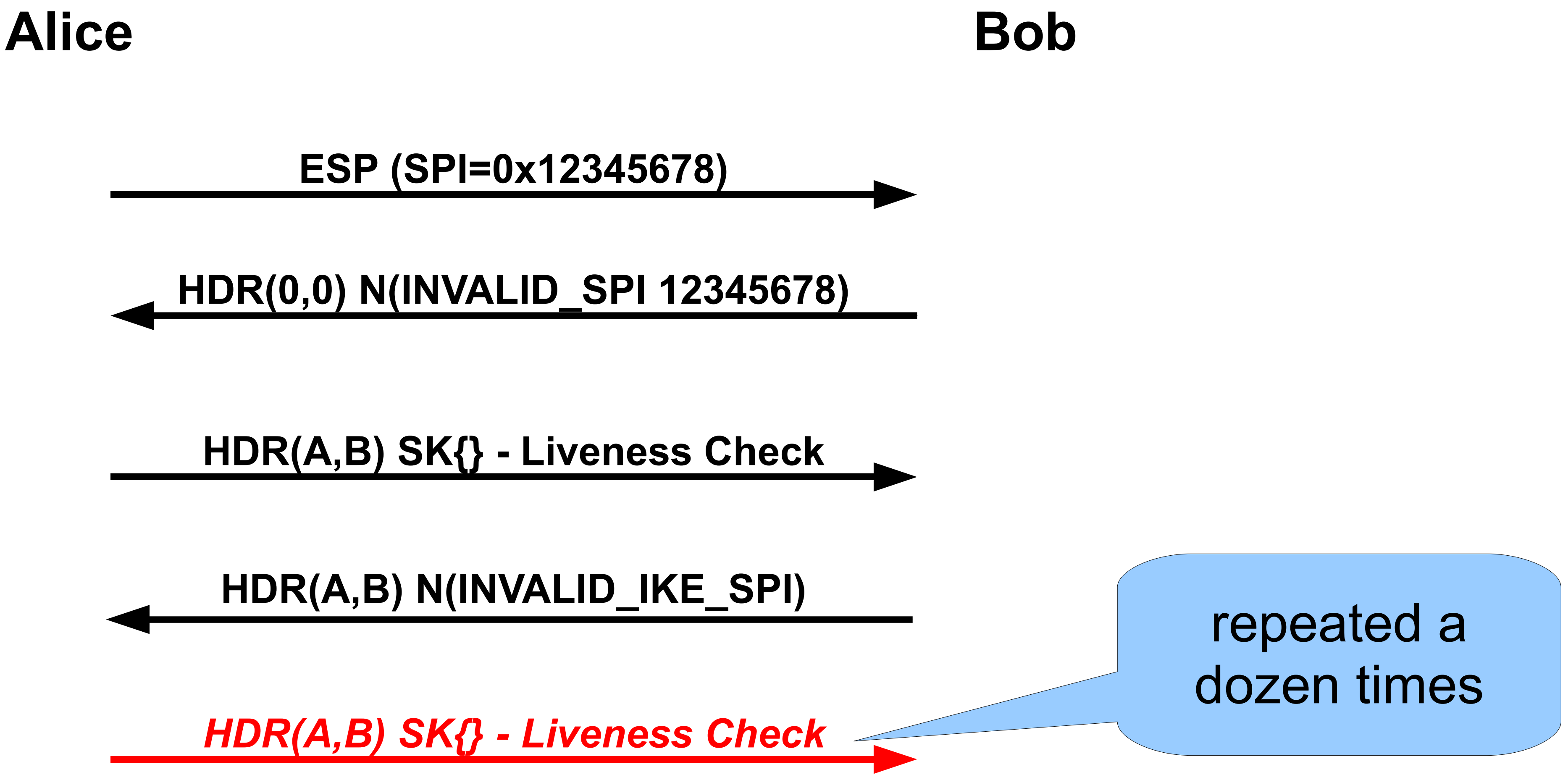
Fast & Secure Crash Detection in IKEv2

Solving the Problem of Quickly Detecting Dangling SAs.

F. Detienne
Y. Nir
P. Sethi

Crash Detection Problem Statement

- Sometimes SAs get out-of-sync, for example, when one side reboots. Recovery then takes minutes.
- Assume Bob has rebooted:



Alice

Bob

ESP (SPI=0x12345678)

HDR(0,0) N(INVALID_SPI 12345678)

HDR(A,B) SK{} - Liveness Check

HDR(A,B) N(INVALID_IKE_SPI)

HDR(A,B) SK{} - Liveness Check

repeated a dozen times

Proposed Solutions

- SIR – Stateless IKE Recovery
  - This involves Alice querying Bob about the lost SA using an unprotected exchange with a stateless cookie. Throttling and dampening prevent this mechanism's use as an attack vector.
- QCD – Quick Crash Recovery
  - This involves Alice storing Bob's “token” during the AUTH exchange. Bob can recalculate the token, proving it's really Bob, and authenticating the INVALID_IKE_SPI message.
- Birth Certificates
  - These are actually signed timestamps or restart counters. Bob will send the new one to Alice, along with the INVALID_IKE_SPI notification, proving he's rebooted.