Software-Defined Networking (SDN)-based IPsec Flow Protection

(draft-abad-i2nsf-sdn-ipsec-flow-protection-00)

Rafael Marín-López

Gabriel López-Millán

(University of Murcia)

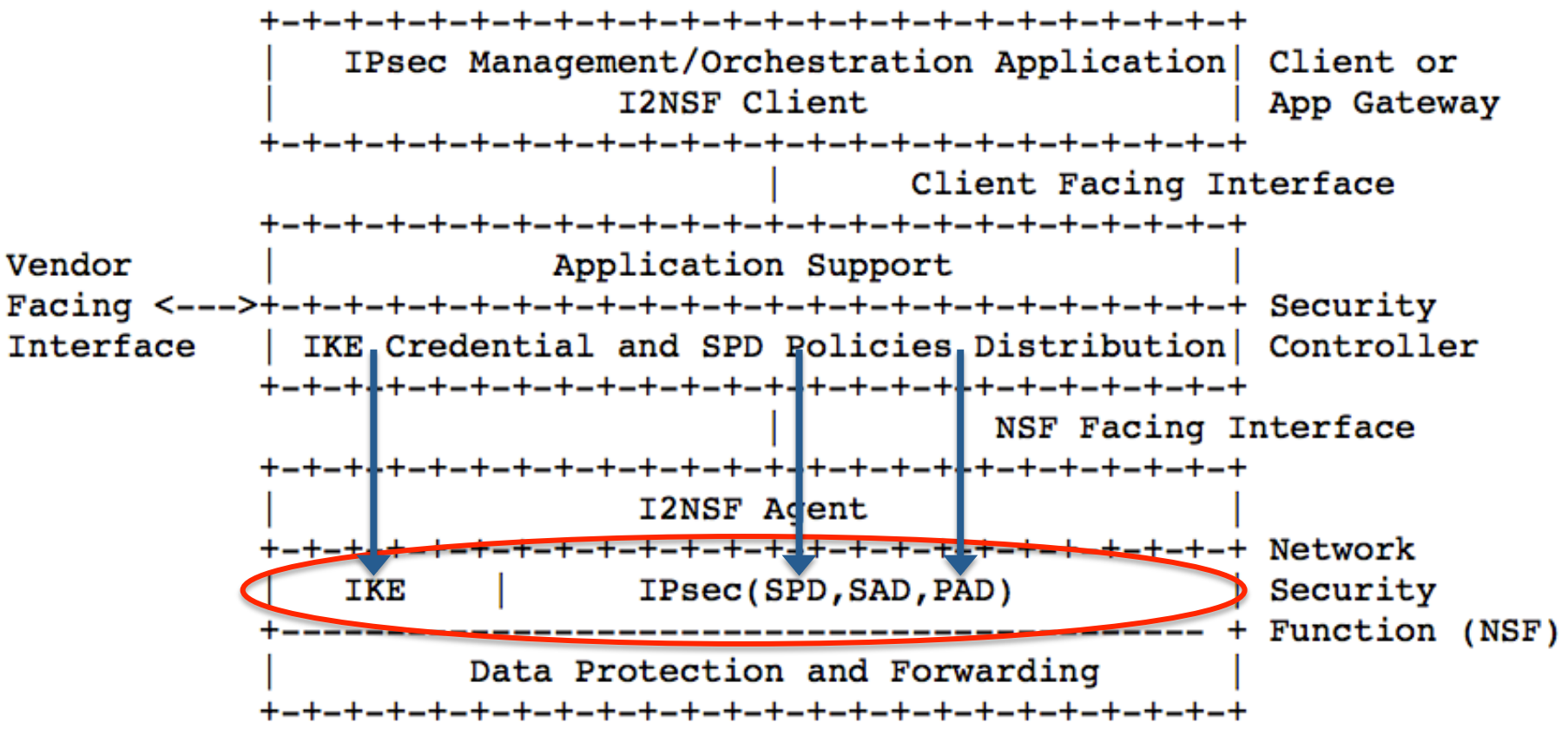
Introduction

- IPsec management (e.g. policies) is manually configured in the network devices.
  - This makes the IPsec security association (SA) management difficult
  - generates a lack of flexibility, specially if the number of security policies and SAs to handle is high.
- Software-Defined Networking (SDN) is an architecture that enables users to directly program, orchestrate, control and manage network resources through software
- **SDN-based management of IPsec SAs.**

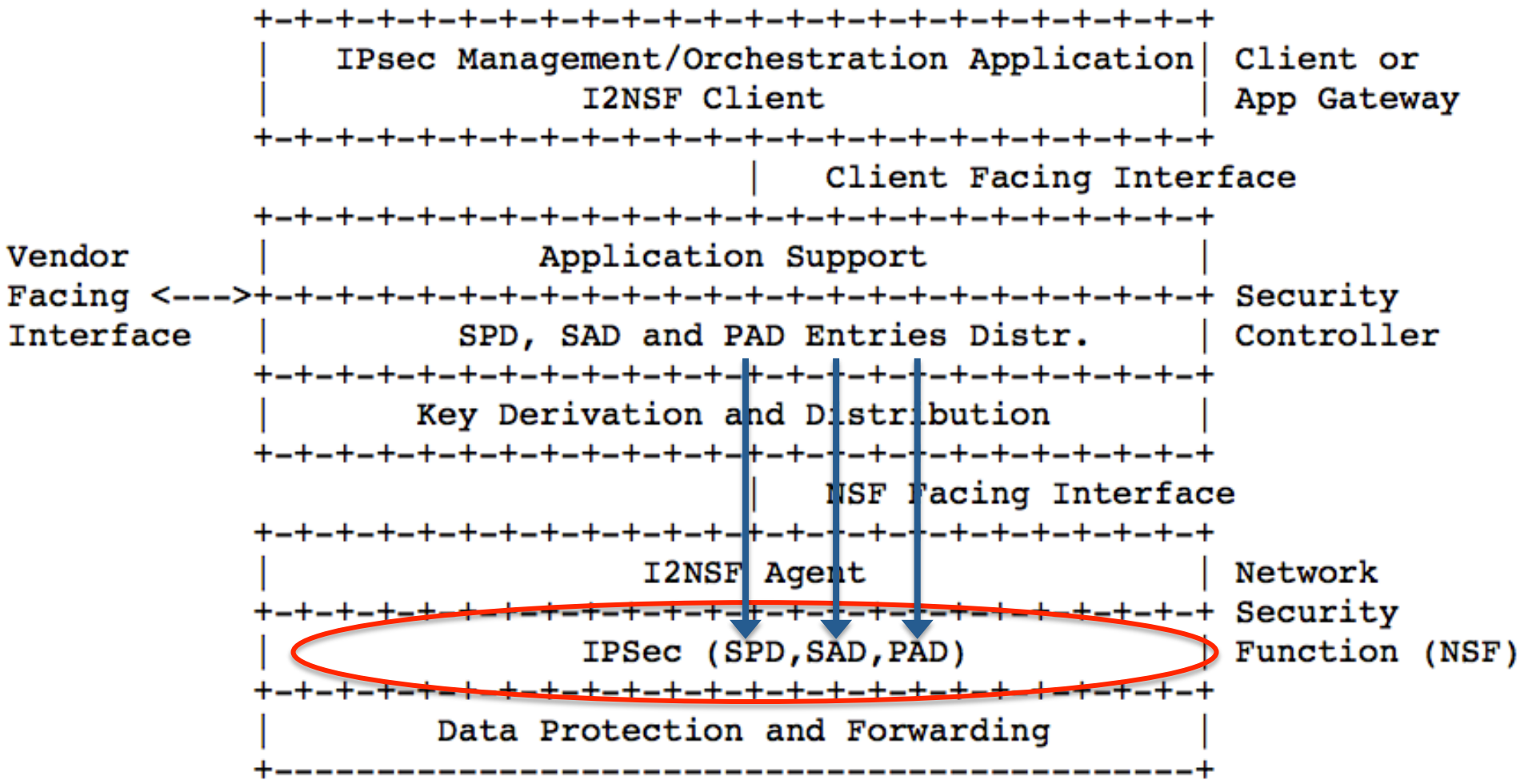
IPsec: Overview

- IPsec protection: AH and/or ESP.
- IPsec separates protection of the IP packets from the key management procedures.
- IPsec manages three databases:
  - Security Policy Database (SPD)
  - Security Association Database (SAD)
  - Peer Authorization Database (PAD)
- A default key management protocol is the Internet Key Exchange (IKE)
- Proposal: a **centralized security controller** is in charge of **key management procedures** in several flow-based NSFs that implements IPsec.

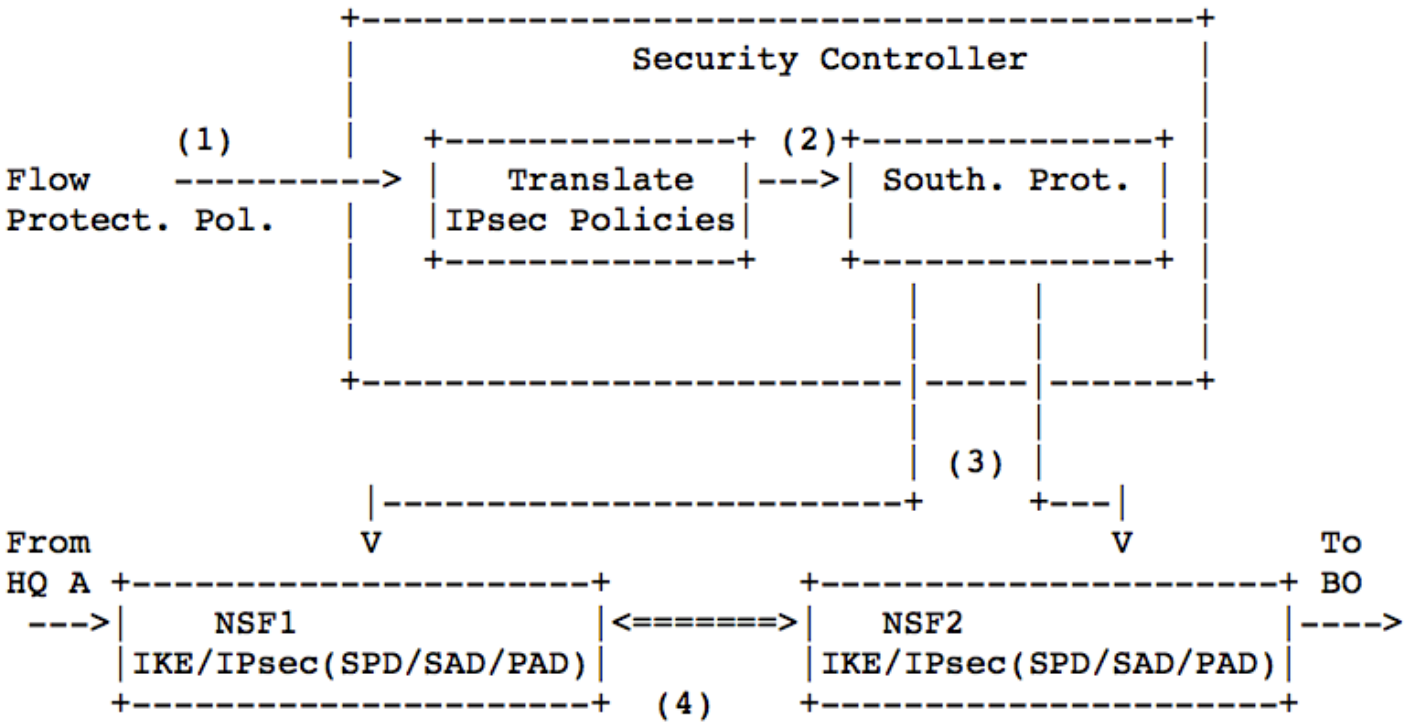
Case 1: IKE/IPsec in the NSF



Case 2: IPsec (no IKE) in the NSF



Example: NSF-to-NSF



Abstract Interface

- Applicable to NSF Facing Interface.
- To manage SAD: RFC 2367 (PF_KEYv2)
  - SADB_ADD, SADB_DELETE, SADB_GET, SADB_ACQUIRE, SADB_EXPIRE, SADB_FLUSH, …
- To manage SPD: extension to PF_KEYv2
  - SADB_X_SPDADD, SADB_X_SPDDELETE, SADB_X_SPDACQUIRE, SADB_X_SPDFLUSH
- Pending: to manage IKE implementation.

Data model

- On-going work.
- It is required to model:
  - SPD
  - SAD
  - PAD
  - IKE

Software-Defined Networking (SDN)-based IPsec Flow Protection

(draft-abad-i2nsf-sdn-ipsec-flow-protection-00)

Rafael Marín-López

Gabriel López-Millán

(University of Murcia)