IETF-115
Report of I2NSF Hackathon Project
November 8, 2022
Champions: Jaehoon (Paul) Jeong and Patrick Lingga
Members: Jiyong Uhm [Presenter], Jeonghyeon Kim, and Mose Gu
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I2NSF (Interface to Network Security Functions) Framework Project

Champion: Jaehoon (Paul) Jeong

Where to get Code and Demo Video Clip
- Github – Source Code
  - https://github.com/jaehoonpaul/i2nsf-framework
  - https://github.com/patrick8link/i2nsf-ipsec
  - https://www.youtube.com/watch?v=l-b5Mx0s7zw

What to pull down to set up an environment
- https://github.com/patrick8link/docker-i2nsf-ipsec

- OS: Ubuntu 14.04
- DockerHub: sysrepo/sysrepo-netopeer2:legacy
- Libyang v1.0.184
- Strongswan v5.5.0

Manual for Operation Process
- README.md contains detailed description about operation process. It can be found in the GitHub.

Contents of Implementation
- IPsec Flow Protection based on SDN for I2NSF Framework
  - SPD, PAD, IKE parameters for IPsec Configuration according to RFC 9061
  - Interactive client for Security Controller
  - IPsec tunnel configuration using IKEv2 protocol
  - Console-based Developer’s Management System
  - I2NSF Framework in Docker Container
  - I2NSF Capability YANG Data Model
  - IPsec SA establishment through Security Controller via NETCONF/YANG
  - Registration Interface via NETCONF/YANG
  - NS-Facing Interface via NETCONF/YANG

- West/Eastbound Interface (Security Controller-Facing Interface)
  - IPsec SA establishment across different Domains
  - IPsec tunnel configuration between two Security Controllers via NETCONF/YANG

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- Younghan Kim (SSU)

Researchers:
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- Yunchul Choi (ETRI)

Students:
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IETF Hackathon – I2NSF Framework

Hackathon Plan (1/2)

Security Client

I2NSF User

Consumer-Facing Interface

Security Management System

Developer’s Management System

Registration Interface

Security Controller

Application Interface

I2NSF Analyzer

NSF-Facing Interface

Security Network

NSF A

NSF B

NSF C

NSF D

Monitoring Interface

NSF: Network Security Function (e.g., Firewall, Web Filter, Deep Packet Inspection, Antivirus, etc.)

Client

Server
Hackathon Plan (2/2)

- Implementation of **IPsec Flow Protection based on SDN for I2NSF Framework**:
  - RFC 9061: A YANG Data Model for IPsec Flow Protection Based on Software-Defined Networking (SDN)
    - [https://datatracker.ietf.org/doc/rfc9061/](https://datatracker.ietf.org/doc/rfc9061/)

- Implementation of **West/Eastbound Interface (Security Controller-Facing Interface)** for I2NSF Framework:
  - [draft-kim-i2nsf-security-controller-interface-dm-00](https://datatracker.ietf.org/doc/draft-kim-i2nsf-security-controller-interface-dm-00)
The Security Controller is in charge of provisioning the NSF with the required information in the SPD and PAD (e.g., IKE credentials) and the IKE protocol itself (e.g., parameters for the IKE_SA_INIT negotiation).
PAD, IKE, and SPD parameters according to RFC 9061.
Security Controller A receiving IPsec configuration for NSF-2 from Security Controller B.

RPC reply from Gateway 1 to Controller 1.
What got done (4/4)

TCP dump of ESP packets from IPSEC configuration between NSF-2 and NSF-3.
What we learn

• IPsec SA establishment between NSFs is possible through the Security Controller. Establishing IPsec tunnel is possible with minimal intervention from the network administrator.

• In a case of multiple domains, it is possible to create IPsec tunnel by exchanging the SPD and PAD parameters between the Security Controllers.
Next Step

• For NSFs where IKEv2 is not available, IKE-less case is possible. As discussed in RFC 9061, this moves the task of managing SAD from IKEv2 to Security Controllers.

• Implementation of IKE-less case for the West/Eastbound Interface (Security Controller Facing Interface) will be done.
Open-Source Project at GitHub

URL:
https://github.com/patrick8link/i2nsf-ipsec

URL:
https://github.com/patrick8link/docker-i2nsf-ipsec

Acknowledgment

This repository updates the work of https://globa.lib.umd.edu/rlipsky/4/baron to reflect current release of RFC8651.

Original work by:

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- Fernando Penedo García (ferrando dot penedo at cau dot upct dot es, University of Defense Center, UCD)
- Gabriel López Millán (gabiRM at um dot es, University of Murcia)
Demonstration Video Clip at YouTube

URL: https://www.youtube.com/watch?v=l-bSMxOs7zw
Wrap Up

Hackathon Team

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