IETF-116

I2NSF Hackathon Project

March 25-26, 2022

Champion: Jaehoon (Paul) Jeong

Presenter: Yiwen (Chris) Shen

Members: Patrick Lingga, Jeonghyeon Kim, and Linda Dunbar

Sungkyunkwan University, Kyungsung University, and Futurewei
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/tree/wldyd
  - https://www.youtube.com/watch?v=l-bSMx0s7zw

What to pull down to set up an environment
- OS: Ubuntu 16.04
- 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
  - 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
- Latest Registration Interface via NETCONF/YANG
- Latest Consumer-Facing Interface via RESTCONF/YANG with Interactive Client
- NSF-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

I2NSF Hackathon Project

Professors:
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- Younghan Kim (SSU)
- Yiwen (Chris) Shen (KSU)

Researchers:
- Jung-Soo Park (ETRI)
- Yunchul Choi (ETRI)

Students:
- Patrick Lingga (SKKU)
- Jeonghyeon Kim (SKKU)
Hackathon Plan (1/2)

Security Client

I2NSF User

Consumer-Facing Interface

Security Management System

Security Controller

Query
Registration Interface
Register

Developer's Management System (DMS)

NSF-Facing Interface

Security Network

NSF 1
NSF 2
NSF 3
NSF 4

NSF: Network Security Function (e.g., Firewall, URL Filtering, Deep Packet Inspection, Antivirus)

Client

Server

IETF-116 Hackathon – I2NSF Framework
Hackathon Plan (2/2)

❖ Implementation of latest version of **Consumer-Facing Interface YANG Data Model** for I2NSF Framework:
  • draft-ietf-i2nsf-consumer-facing-interface-dm-26

❖ Implementation of latest version of **Registration Interface YANG Data Model** for I2NSF Framework:
  • draft-ietf-i2nsf-registration-interface-dm-23
What got done (1/4)

Endpoint Registration

High-level Configuration
What got done (2/4)

Translated Security Policy for Confirmation
What got done (3/4)

- Update of Registration Interface in the I2NSF Framework

**NEW Version:**

Security Controller ➔ NETCONF Server ➔ Registration Interface ➔ NETCONF Client ➔ Register

**OLD Version:**

Security Controller ➔ Registration Interface ➔ DMS ➔ NETCONF Client

IETF-116 Hackathon – I2NSF Framework
## Registered NSFs from the DMS

### General Firewall
- **Name**: general-firewall
- **Version**: 1.2.0
- **Access Information**:
  - IP: [redacted]
  - Protocol: NETCONF
  - Port: 830
- **Specifications**:
  - CPU: Intel(R) Core(TM) i7-10510U
  - Memory: 8192 MB
  - Bandwidth: 1000 MBps

### Time-Based Firewall
- **Name**: time-based-firewall
- **Version**: 1.2.0
- **Access Information**:
  - IP: [redacted]
  - Protocol: NETCONF
  - Port: 830
- **Specifications**:
  - CPU: Intel(R) Core(TM) i7-10510U
  - Memory: 8192 MB
  - Bandwidth: 1000 MBps

### URL Filtering
- **Name**: url-filtering
- **Version**: 5.1.2
- **Access Information**:
  - IP: [redacted]
  - Protocol: NETCONF
  - Port: 830
- **Specifications**:
  - CPU: Intel(R) Core(TM) i7-10510U
  - Memory: 8192 MB
  - Bandwidth: 1000 MBps
What we learn

• The latest version of Consumer-Facing Interface YANG Data Model enables easy configuration for an I2NSF User.
  – The YANG data model provides necessary high-level information for NSFs configuration to the I2NSF User.
  – The high-level security policy can be translated to the low-level security policy.

• The latest version of Registration Interface YANG Data Model simplifies the architecture of the I2NSF Framework.
  – The YANG data model allows both registration and query of NSFs’ capabilities as a simple and consistent way.
Next Step

• Implementation of security policy life-cycle for dynamic policy updates.
  – Verification of security policy that performs the necessary actions to ensure that requested high-level security policy will be achieved.
  – Analysis of network behavior with a machine learning scheme and Reconfiguration of appropriate security policies will be performed in real time.
Open-Source Project at GitHub

URL: https://github.com/jaehoonpaul/i2nsf-framework/tree/master/Hackathon-116
Demonstration Video Clip at YouTube

URL: https://www.youtube.com/watch?v=_XsKVpMD9s4&t=9s
Wrap Up

Hackathon Team

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