# IETF-116
# I2NSF Hackathon Project

**March 25-26, 2022**

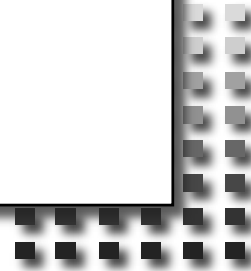**Champion: Jaehoon (Paul) Jeong**

**Presenter: Patrick Lingga**

**Members: Jeonghyeon Kim, Yiwen (Chris) Shen, and Linda Dunbar**

**Sungkyunkwan University, Kyungsung University, and Futurewei**

**I E T F**

# I2NSF (Interface to Network Security Functions) Framework Project

## Champion: Jaehoon (Paul) Jeong

IETF 116 Yokohama
25-31 March 2023

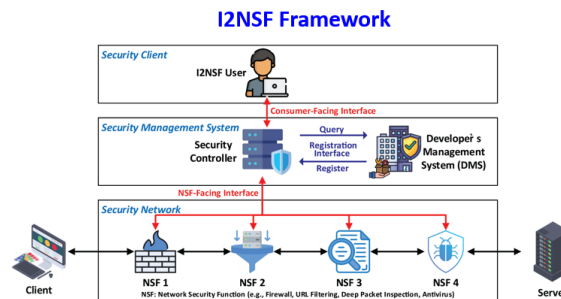### I2NSF Hackathon Project

## Professors:

- Jaehoon (Paul) Jeong (SKKU)
- Younghan Kim (SSU)
- Yiwen (Chris) Shen (KSU)

## Researchers:

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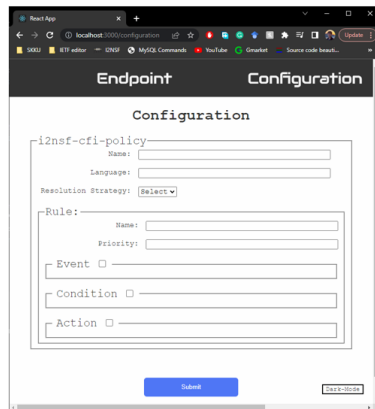- Yunchul Choi (ETRI)

## Students:

- Patrick Lingga (SKKU)
- Jeonghyeon Kim (SKKU)

### I2NSF Framework



**Updated Registration Interface**



**User-Friendly Consumer-Facing Configuration**



## 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-bSMxOs7zw

## 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
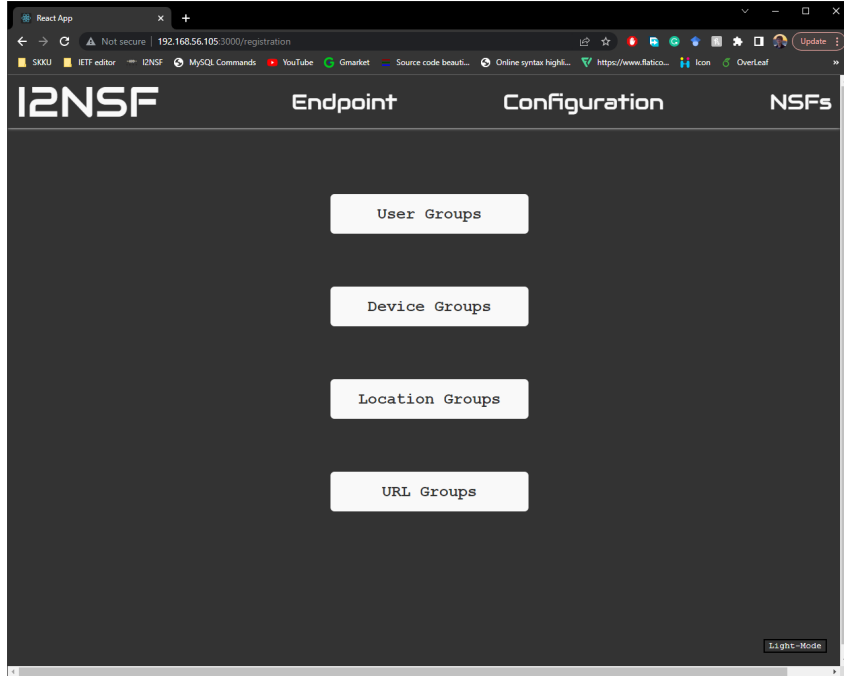  - ✓ IPsec tunnel configuration between two Security Controllers via NETCONF/YANG
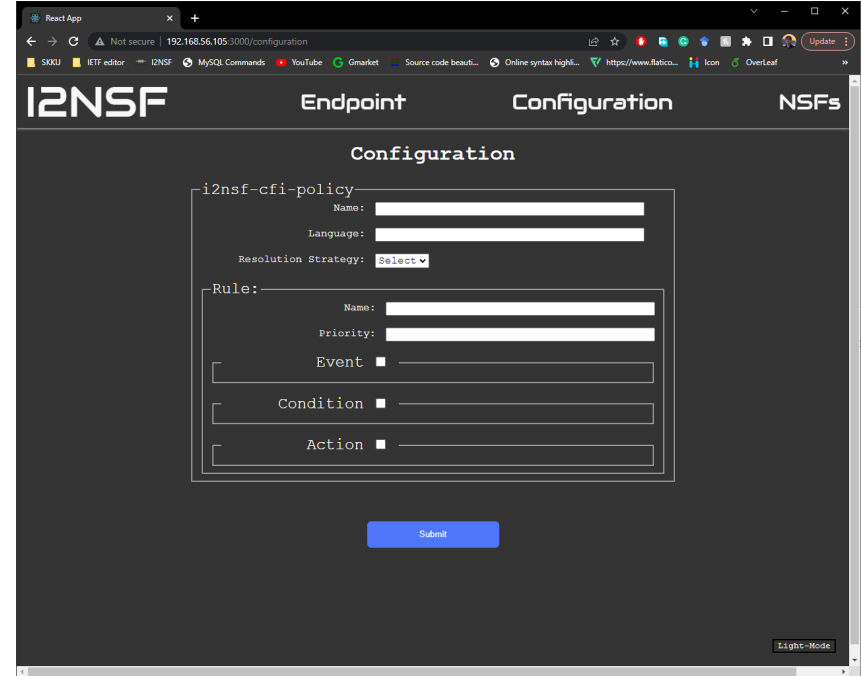
# Hackathon Plan (1/2)
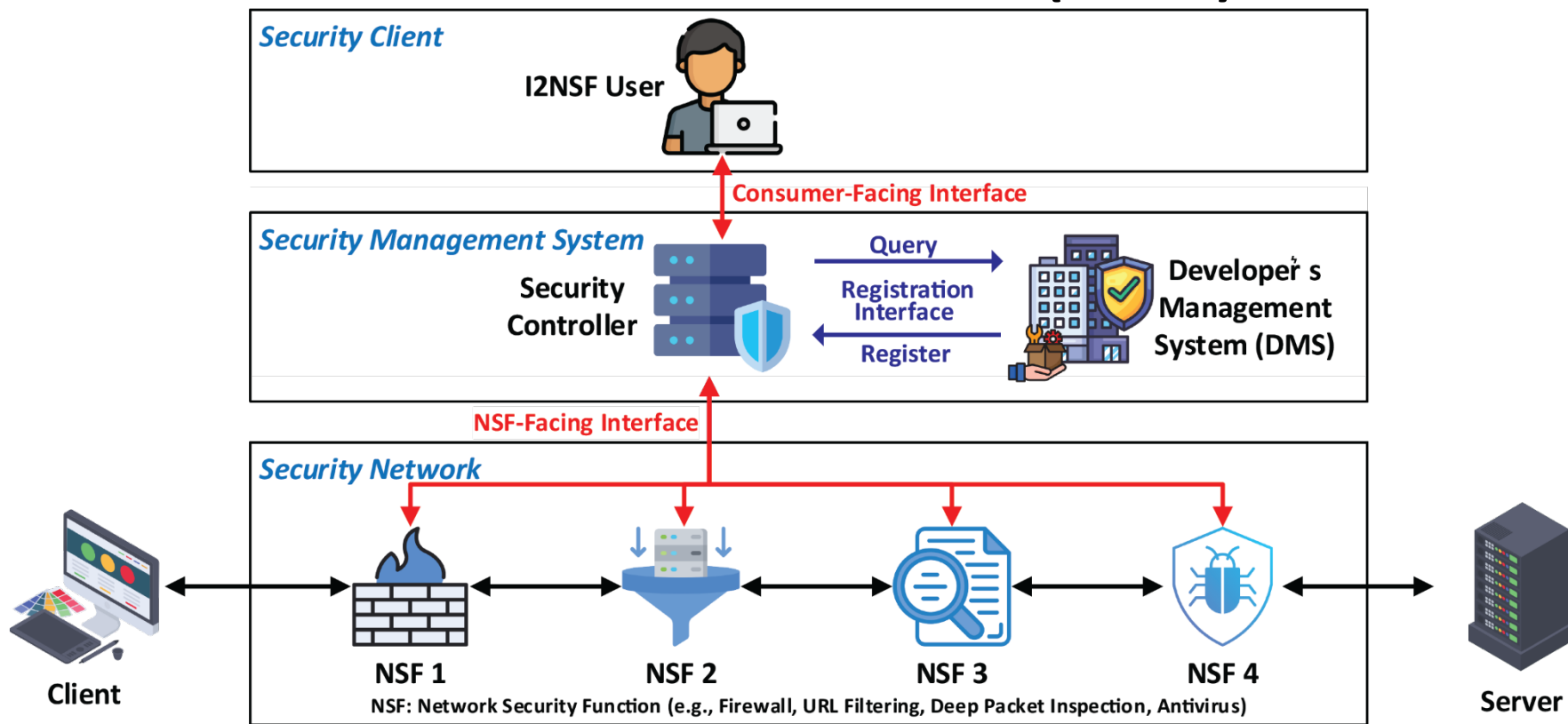
# Hackathon Plan (2/2)

❖ **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
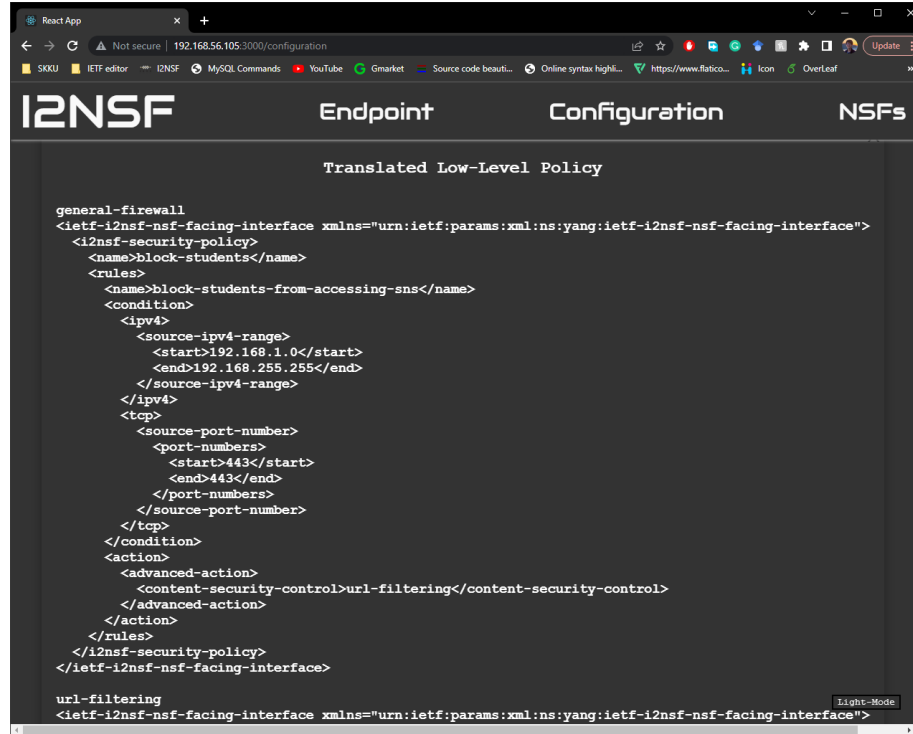
# What got done (1/4)



Endpoint Registration
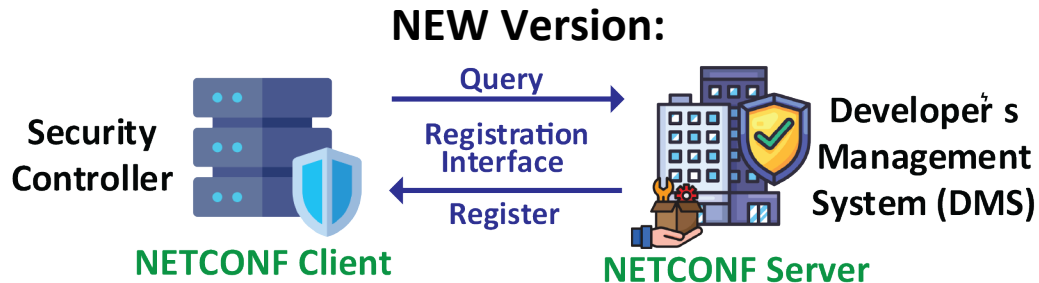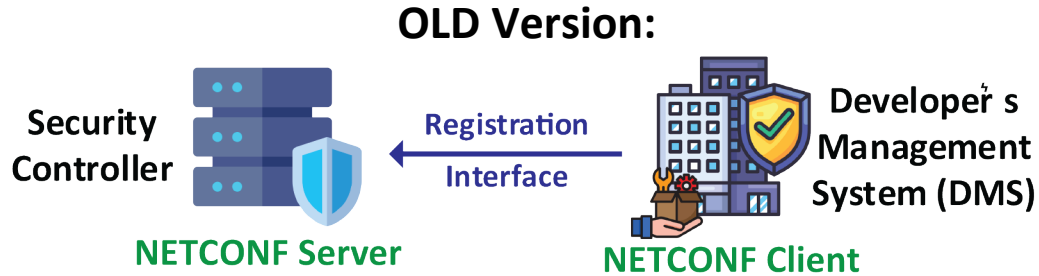


High-level Configuration

# What got done (2/4)



Translated Security Policy for Confirmation

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# What got done (3/4)

- Update of Registration Interface in the I2NSF Framework

**OLD Version:**

Security Controller

NETCONF Server

Registration Interface

Developer's Management System (DMS)

NETCONF Client

**NEW Version:**

Security Controller

NETCONF Client

Query

Registration Interface

Register

Developer's Management System (DMS)

NETCONF Server

# What got done (4/4)



Registered NSFs from the DMS

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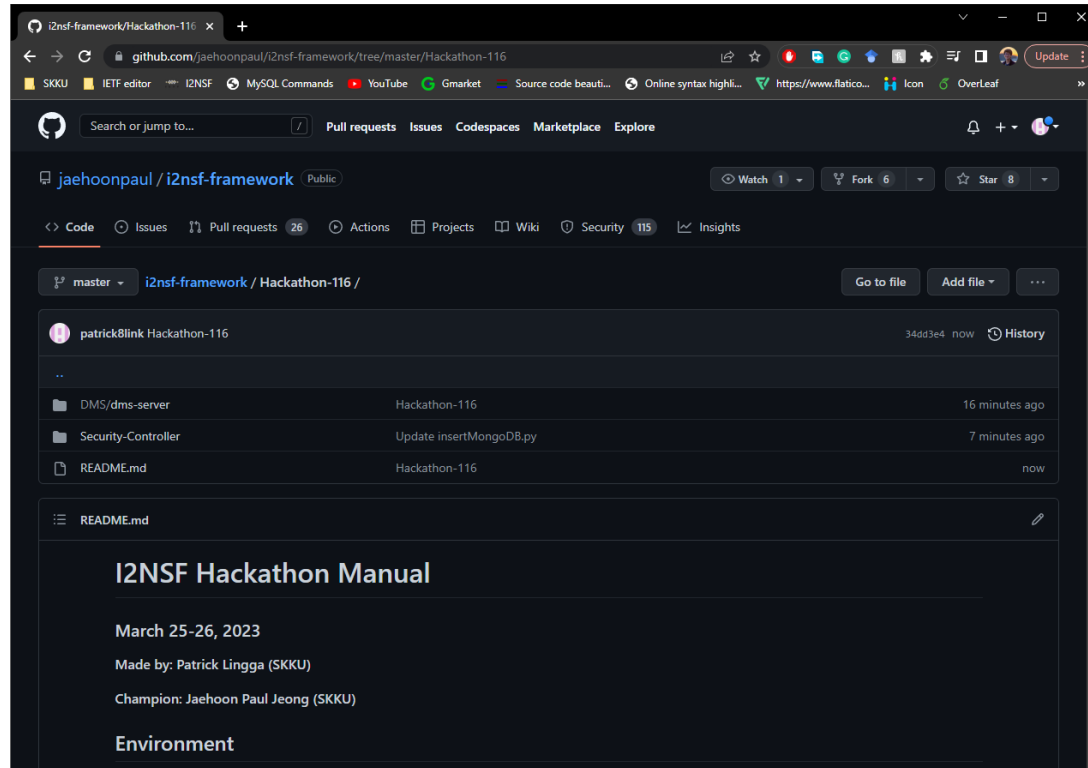
- The latest version of Consumer-Facing Interface YANG Data Model enables easy configuration for an I2NSF User.
  - The YANG data model provides necessary high-level information for NSFs configuration to the I2NSF User.
  - The high-level security policy can be translated to the low-level security policy.

- 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.
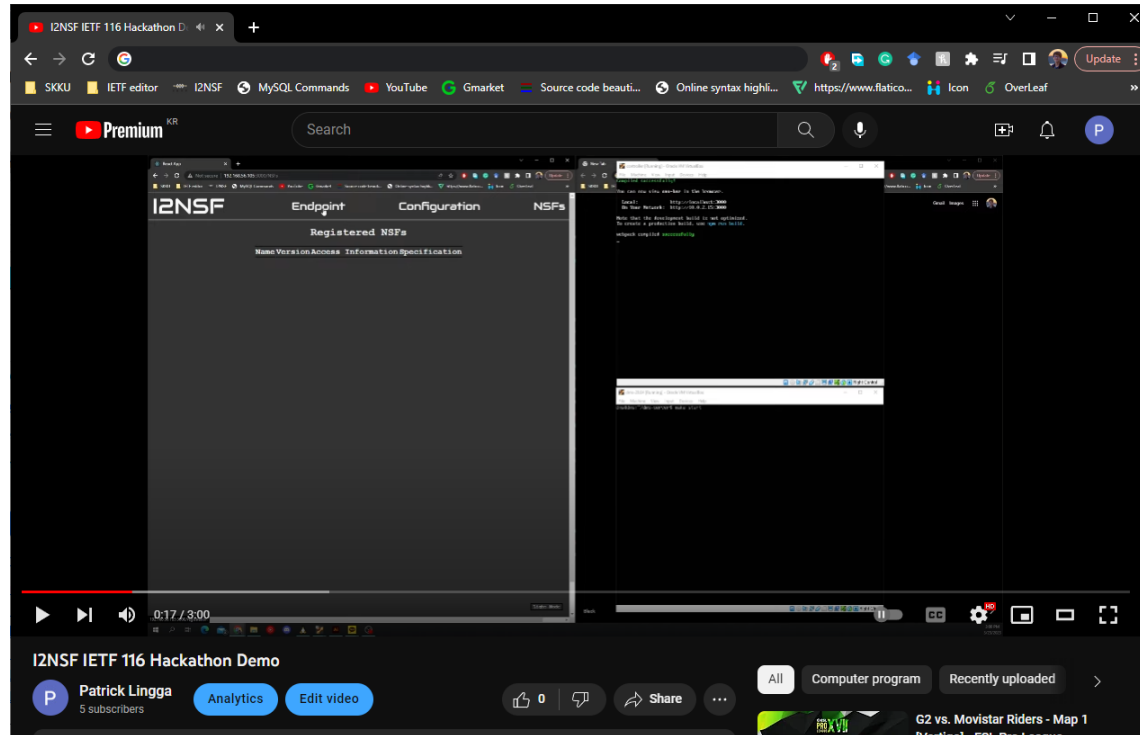
# Open-Source Project at GitHub

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



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# Demonstration Video Clip at YouTube

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

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# Wrap Up

## Hackathon Team

**Champion:**

- **Jaehoon Paul Jeong (SKKU)**

**Professor:**

- **Younghan Kim (SSU)**
- **Yiwen (Chris) Shen (KSU)**

**Members:**

- **Linda Dunbar (Futurewei)**
- **Jung-Soo Park (ETRI)**
- **Yunchul Choi (ETRI)**
- **Patrick Lingga (SKKU)**
- **Jeonghyeon Kim (SKKU)**
- **Nobuo Aoki (National Institute of Informatics)**

## Hackathon Team Photo