

I2NSF Framework Project @ IETF-103 Hackathon



IETF 103, Bangkok

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I2NSF Framework: What Did We Do This Time?

❖ I2NSF: Data-Driven Security Policy Enforcement

- We implemented I2NSF Framework on top of OpenStack with NFV Reference Architecture.

❖ This work is an Open Source Project!

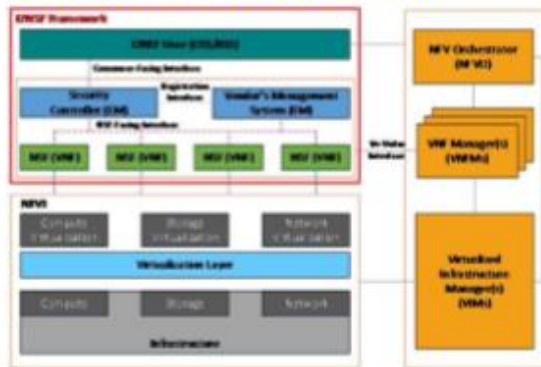
- 8 graduate students (Sungkyunkwan University) and 4 graduate students (Soongsil University)
- 4 professors (Sungkyunkwan, Soongsil, and Chosun Universities)
- 2 researchers (ETRI and KT Corporation)
- Open Source Code on Github
 - <https://github.com/kimjinyong/i2nsf-framework/tree/master/Hackathon-103>

IETF I2NSF (Interface to Network Security Functions) Working Group: I2NSF Framework Project

Champion: Jaehoon Paul Jeong (SKKU)



I2NSF Architecture in NFV Reference



Where to get code

- Github – Source code
✓ <https://github.com/kimjinyong/i2nsf-framework>

What to pull down to set-up environment

- OS: Ubuntu 14.04TL
- ConfD for NETCONF: 6.2 Version
- Apache2: 2.4.7 Version
- MySQL: 14.14 Version
- PHP: 5.5.9 Version
- OpenStack: Networking-SFC, Tacker
- Jetconf: Python Open API for RESTCONF

Professors

- Jaehoon (Paul) Jeong (Sungkyunkwan)
- Hyoungshick Kim (Sungkyunkwan)
- Younghan Kim (Soongsil)
- Sangwon Hyun (Chosun)

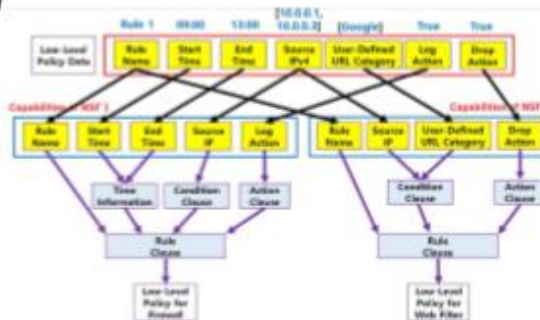
Collaborators

- Jung-Soo Park (ETRI)
- Tae-Jin Ahn (Korea Telecom)

Students

- Jinyong (Tim) Kim
- Eunsoo Kim
- Dongjin Hong
- Tae-Kyun Roh
- Sarang Wi
- Seungjin Lee
- Jinhyuk Yang
- Jaehong Jeong
- Hyunsik Yang
- Kyoungjae Sun
- Jaewook Oh
- Xianjun Hong

Security Policy Translation



Network Security Functions (NSF) - Triggered Steering



Manual for Operation Process

- Detailed descriptions about operation process in README.txt (can be found in the VM image)

Contents of Implementation

- I2NSF Framework for provisioning Network Security Functions (NSFs)
 - ✓ Consumer-Facing Interface via RESTCONF/YANG
 - ✓ NSF-Facing Interface via NETCONF/YANG
 - ✓ Registration Interface via NETCONF/YANG
 - ✓ I2NSF Framework in NFV Environment using OpenStack (New Feature)
- Network Security Functions
 - ✓ Firewall using SDN and Suricata
 - ✓ Mail-filter and Web-filter using Suricata
- Advanced Functions
 - ✓ Security Policy Translation
 - ✓ I2NSF Policy Provisioning
 - ✓ NSF-triggered Traffic Steering using OpenStack Networking-SFC (New Feature)

Goal of IETF-103 I2NSF Framework Project

❖ Integration of **IETF I2NSF Framework** and **ETSI NFV Reference Architecture**

1. Design of **I2NSF Framework** in **NFV Reference Architecture**
2. Dynamic Creation of **Virtual NSFs** according to **Security Policy** using **OpenStack Tacker**
3. Service Function Chaining for **Traffic Steering** using **OpenStack Networking-SFC**

Limitations and Challenges of I2NSF Project

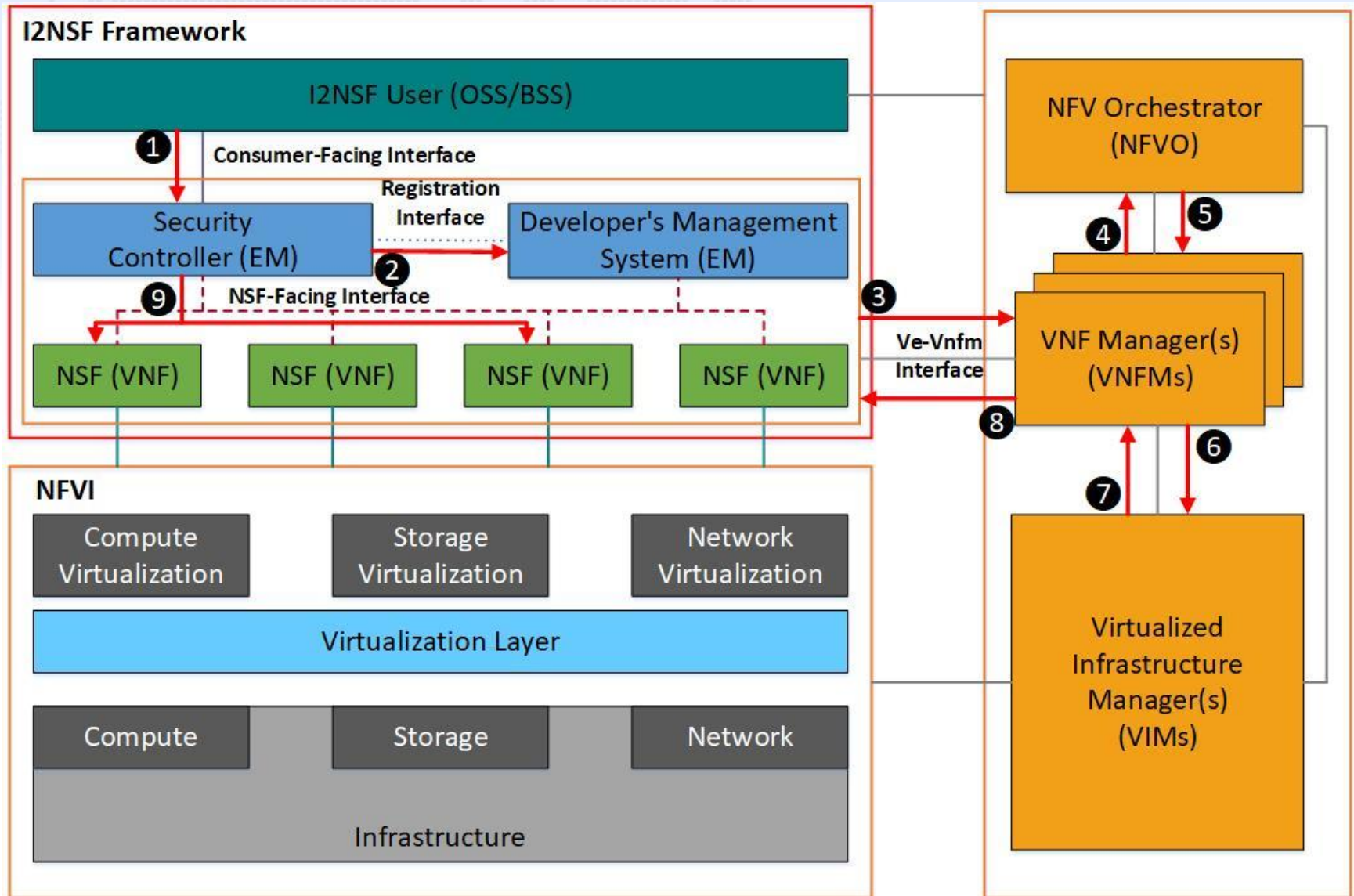
❖ **Limitations** of the Previous I2NSF Open Source

- The I2NSF Framework was implemented in Mininet for Proof of Concept (POC).
- So, it could not be used in the real world.

❖ **Challenges** of I2NSF Framework Project

1. Design: How to place the elements of I2NSF Framework in NFV Environment (NFV-I2NSF)?
 - I2NSF User, Security Controller, Developer's Management System, and Network Security Functions
2. Dynamic Creation of Virtual NSFs in NFV-I2NSF
 - Procedure of Security Policy Translation and Enforcement
3. Service Function Chaining in NFV-I2NSF
 - Traffic Steering Control for Security Policy in NFV-I2NSF

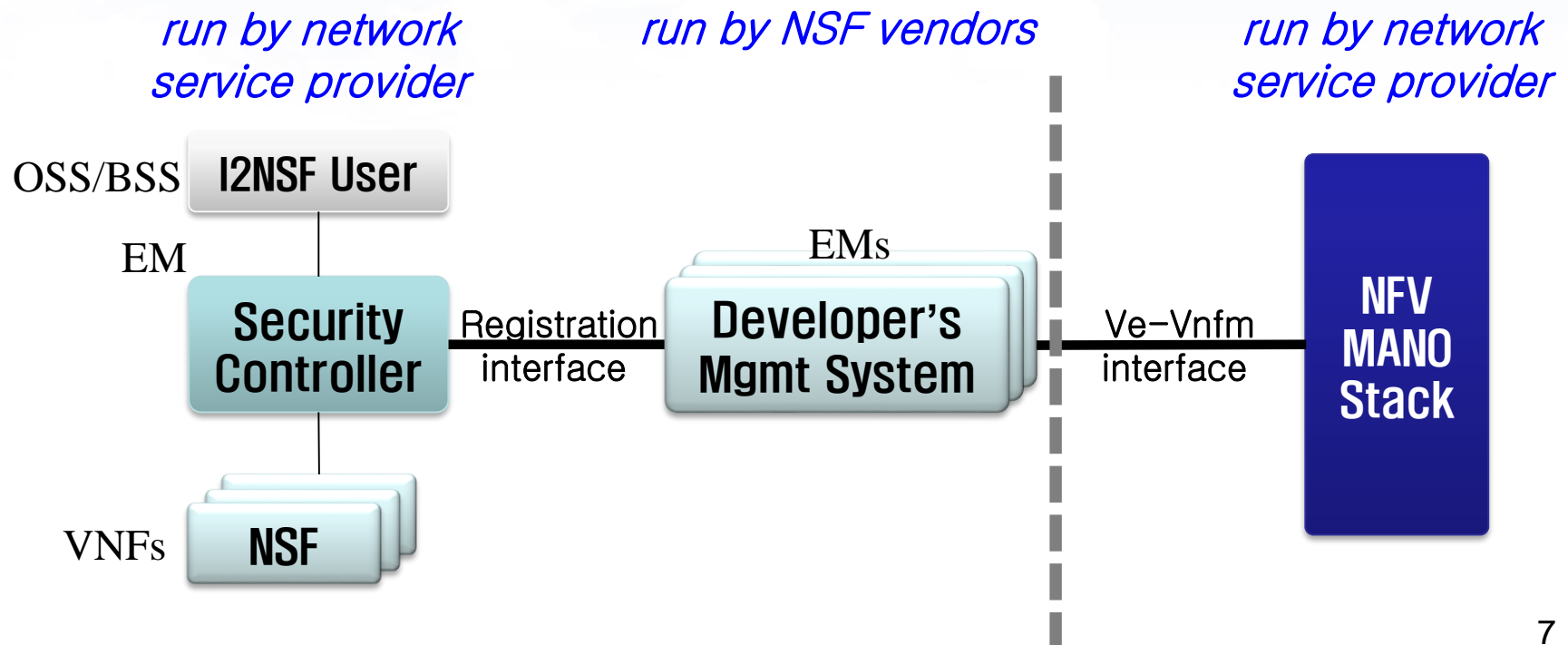
I2NSF Framework in NFV Reference Architecture



I2NSF Framework in NFV Reference Architecture: NFV-I2NSF System

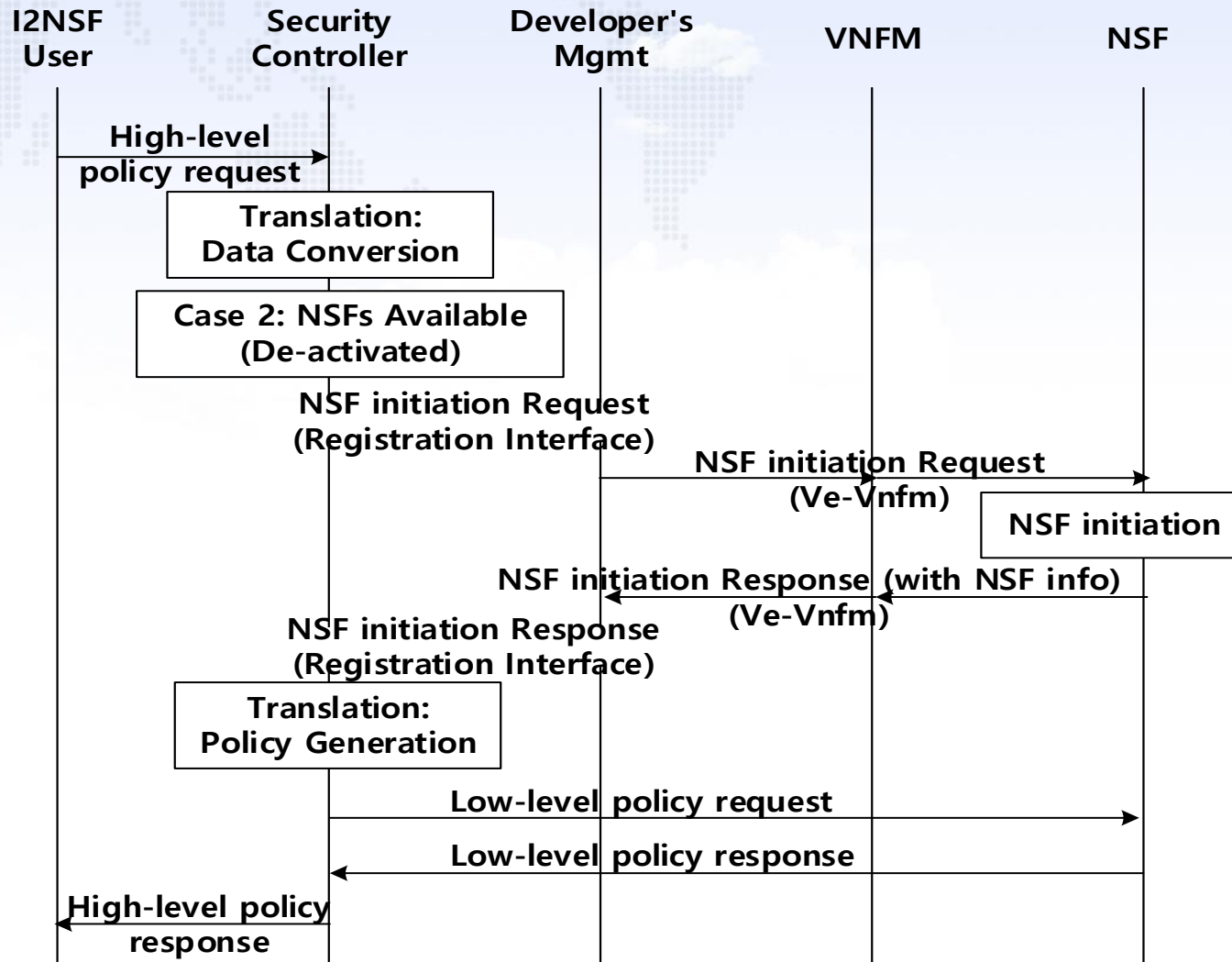
■ Management Subjects and Objects in NFV-I2NSF

- Network Service Provider
 - ✓ I2NSF User, Security Controller, NSFs, and NFV MANO
- NSF Vendors
 - ✓ Developer's Management System



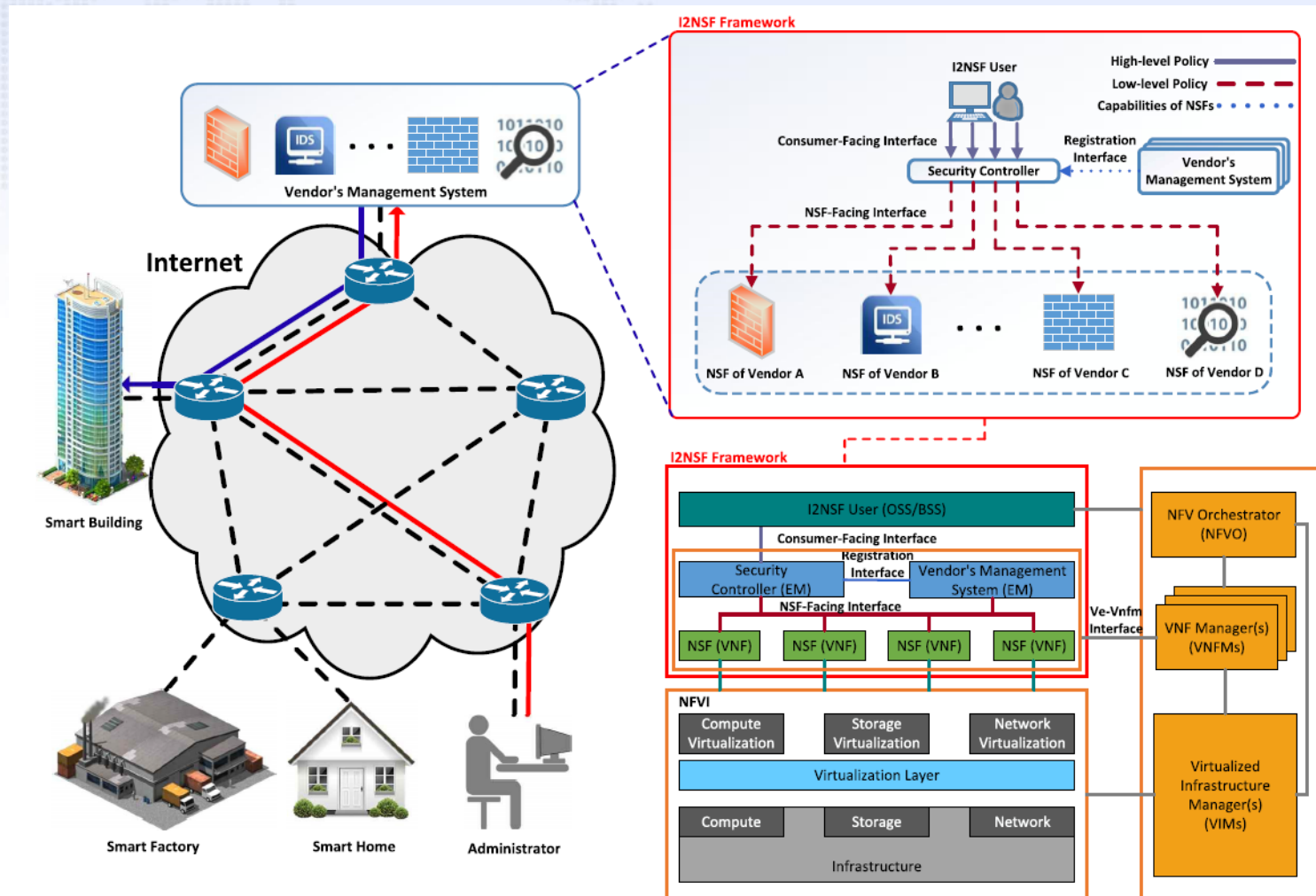
I2NSF Operations in NFV-I2NSF System

- Procedure of Security Policy Enforcement in NFV-I2NSF System (Case: NSF is De-activated in NFV)



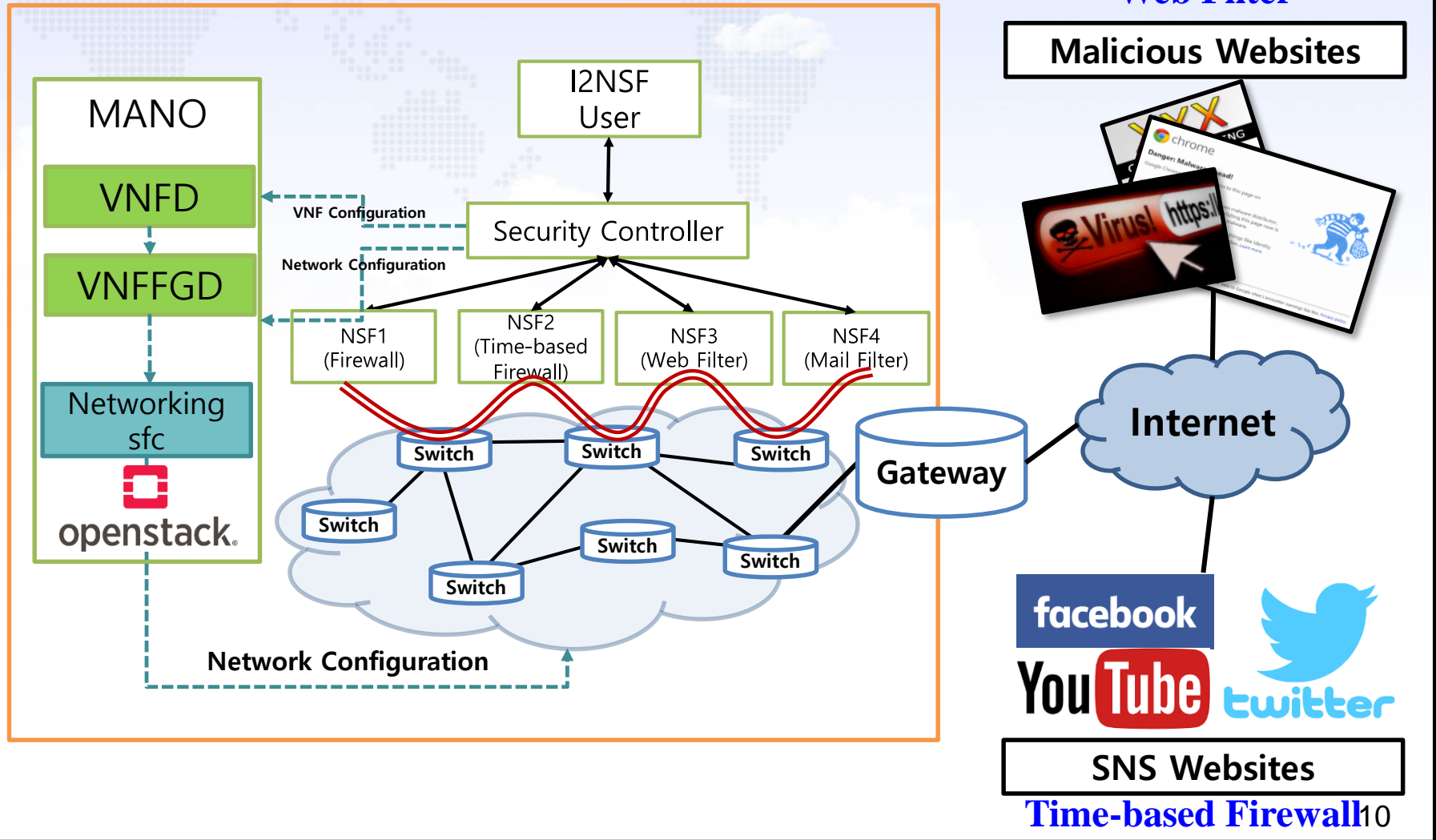
Cloud-Based Security Service System

- **NFV-I2NSF Framework** for Security Services (e.g., Time-Based Firewall, Web Filter, and Attack Mitigator).



Network Topology of this Hackathon Project

- **NFV-I2NSF Framework** for Time-Based Firewall and Web Filter works in the network below.

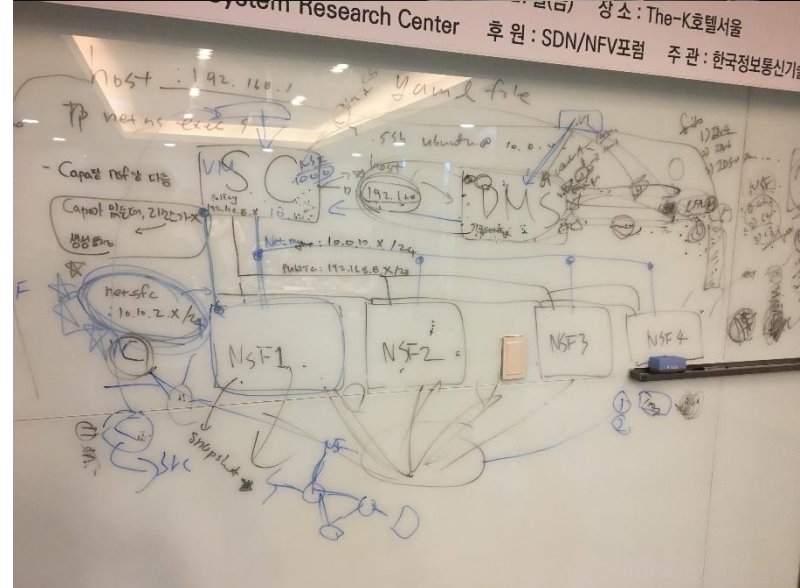


Lessons from IETF-103 Hackathon

- **Proof of Concept (POC) of I2NSF Framework**
 - I2NSF Interfaces (Consumer-Facing, NSF-Facing, and Registration Interface)
 - I2NSF Security Policy Translator
- **Design and Implementation of I2NSF in NFV**
 - Design of I2NSF Framework in NFV
 - Dynamic Creation of Virtual NSFs
 - Service Function Chaining for Traffic Steering
- **Hands-on Experience of OpenStack**
 - Dynamic NSF Creation: **Tacker**
 - SFC-based Traffic Steering: **Networking-SFC**

Hackathon at IETF-Korea

➤ Preparation for IETF-103 Hackathon



Appendix

- Hackathon Development Environment
- Open-Source Depository of I2NSF Project
- Demonstration Video Clip of I2NSF Project



Hackathon Development Environment

Build Environment

1. **OS**
 - Ubuntu 14.04TL
2. **ConfD**
 - 6.2 Version
3. **Apache2**
 - 2.4.7 Version
4. **MySQL**
 - 14.14 Version
5. **PHP**
 - 5.5.9 Version



5. **OpenStack**
 - Networking-SFC, Tacker
6. **Suricata**
 - 3.2.1 RELEASE
7. **Jetconf**
 - Python Open API for RESTCONF



openstack®



ubuntu



Open-Source Depository of I2NSF Project

Github for I2NSF Framework Project

➤ Documents and Source Code

<https://github.com/kimjinyong/i2nsf-framework/tree/master/Hackathon-103>

kimjinyong / i2nsf-framework

Unwatch 3 Star 1 Fork 2

Code Issues 0 Pull requests 0 Projects 0 Wiki Insights Settings

Branch: master i2nsf-framework / Hackathon-103 / Create new file Upload files Find file History

KyleOh Uploaded Security Controller Files Latest commit 2fbd62 Nov 3, 2018

..		
DMS/Developer-mgmt-system	Uploaded DMS Files	Nov 3, 2018
NSF	Uploaded NSF Files	Nov 3, 2018
SecurityController	Uploaded Security Controller Files	Nov 3, 2018
VNFM	Uploaded VNFD	Nov 3, 2018
README.md	Added Hackathon 103	Nov 3, 2018

Demonstration Video Clip of I2NSF Project

Youtube for I2NSF Framework Project

➤ <https://youtu.be/2fTzrDRVqsg>

The screenshot displays a YouTube video player with the URL `https://www.youtube.com/watch?v=2fTzrDRVqsg&feature=youtu.be` in the address bar. The video content shows a web browser window with a configuration page titled "Policy". The page includes a "Rule name" field with the value "test", a "Condition" section with "Source IP" and "Destination IP" fields both set to "10.11.8.101", and a "Start time" dropdown menu. The dropdown menu is open, showing a list of time intervals from "01:00" to "05:00". The video player controls at the bottom indicate the video is at 1:01 / 2:57.

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