I E T F®

I2NSF YANG Data Models

draft-ietf-i2nsf-capability-data-model-02
draft-ietf-i2nsf-consumer-facing-interface-dm-02
draft-ietf-i2nsf-nsf-facing-interface-dm-02
draft-ietf-i2nsf-registration-interface-dm-01

IETF 103, Bangkok

November 7, 2018

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WG Documents of YANG Data Models

- Information Model Draft on NSF Capabilities
  - draft-ietf-i2nsf-capabilities-04
- Base YANG Data Model Draft
  - draft-ietf-i2nsf-capability-data-model-02
- I2NSF Interface YANG Data Model Drafts
  - draft-ietf-i2nsf-consumer-facing-interface-dm-02
  - draft-ietf-i2nsf-nsf-facing-interface-dm-02
  - draft-ietf-i2nsf-registration-interface-dm-01
- Verification of those YANG Data Models
  - Those were verified through the 7 IETF Hackathons (IETF 97 ~ IETF 103).

I2NSF Capability YANG Data Model

(draft-ietf-i2nsf-capability-data-model-02)

IETF 103, Bangkok

November 7, 2018

Susan Hares, Jaehoon Paul Jeong, Jinyong (Tim) Kim,

Robert Moskowitz, and Qiushi Lin

Updates from the Previous Version

- Consistency with **NSF Capabilities Information Model**
  - draft-ietf-i2nsf-capabilities-04.

- Capabilities of Advanced Network Security Functions
  - Anti-Virus
  - Anti-DDoS
  - IPS

- Accommodation for Advanced NSFs Capabilities
  - draft-dong-i2nsf-asf-config-01

- Relationship with Other YANG Data Models
  - The further YANG data models can be used as YANG sub-modules for this Base YANG data model.

Capabilities of Advanced NSFs (1/2)

```
module: ietf-i2nsf-capability
    +--rw nsf* [nsf-name]
       +--rw nsf-name                          string
       +--rw nsf-type?                         nsf-type
       +--rw nsf-address
       |  +--rw (nsf-address-type)?
       |     +--:(ipv4-address)
       |     |  +--rw ipv4-address    inet:ipv4-address
       |     +--:(ipv6-address)
       |        +--rw ipv6-address    inet:ipv6-address
       +--rw target-device
       |  +--rw pc?                  boolean
       |  +--rw mobile-phone?        boolean
       |  +--rw voip-volte-phone?    boolean
       |  +--rw tablet?              boolean
       |  +--rw iot?                 boolean
       |  +--rw vehicle?             boolean
       +--rw generic-nsf-capabilities
       |  +--rw net-sec-capabilities
       |     uses net-sec-caps
       +--rw advanced-nsf-capabilities
       |  +--rw advaneced-sec-capabilities
       |     uses advaneced-sec-caps
       +--rw complete-nsf-capabilities
          +--rw con-sec-control-capabilities
          |  uses i2nsf-con-sec-control-caps
          +--rw attack-mitigation-capabilities
             uses i2nsf-attack-mitigation-control-caps
```

Capabilities of Advanced NSFs (2/2)

```
+--rw advanced-nsf-capabilities
|  +--rw advanced-sec-capabilities
|     +--rw antivirus
|     |  +--rw detect?                    boolean
|     |  +--rw exception-application?     boolean
|     |  +--rw exception-signature?       boolean
|     |  +--rw whitelists?                boolean
|     +--rw antiddos
|     |  +--rw syn-flood-action?             boolean
|     |  +--rw udp-flood-action?             boolean
|     |  +--rw http-flood-action?            boolean
|     |  +--rw https-flood-action?           boolean
|     |  +--rw dns-request-flood-action?     boolean
|     |  +--rw dns-reply-flood-action?       boolean
|     |  +--rw icmp-flood-action?            boolean
|     |  +--rw sip-flood-action?             boolean
|     |  +--rw detect-mode?                  boolean
|     |  +--rw baseline-learn?               boolean
|     +--rw ips
|        +--rw signature-set?          boolean
|        +--rw exception-signature?    boolean
```

Next Steps

- We will change the current YANG data model to the YANG data model of Object-Oriented Style, such as Decorator patterns.
  - Huawei (e.g., Liang (Frank) Xia) will provide us with a sample YANG data model using Decorator patterns.

- After the proofreading by the authors of the NSF Capabilities Information Model document, we will correct the data model and finalize it.

- WG Last Call with this December.

Network Security Functions Facing Interface YANG Data Model

(draft-ietf-i2nsf-nsf-facing-interface-dm-02)

IETF 103, Bangkok

November 7, 2018

Jinyong (Tim) Kim, Jaehoon Paul Jeong, Jung-Soo Park, Susan Hares, and Qiushi Lin

Updates from the Previous Version

- Consistency with **NSF Capabilities Information Model**
  - draft-ietf-i2nsf-capabilities-04.

- **Liang (Frank) Xia's Comments**
  - Add System Policy for multiple system policies in one NSF (Resolved)

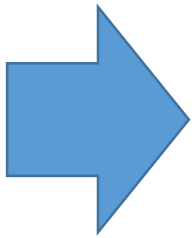
  - Delete agg-ptr attributes due to unclearness (Resolved)
    - policy-event-clause-agg-ptr*
    - policy-condition-clause-agg-ptr*
    - policy-action-clause-agg-ptr*

  - Add policy-usage-type for rule order with priority criteria (Resolved)
    - priority-by-order
    - priority-by-number

System Policy for multiple system policies in one NSF

OLD:

```
module: ietf-i2nsf-policy-rule-for-nsf
+--rw i2nsf-security-policy
|  +--rw policy-name?                          string
|  +--rw rules* [rule-name]
|  |  +--rw rule-name                          string
|  |  +--rw rule-description?                  string
|  |  +--rw rule-priority?                     uint8
|  |  +--rw enable?                            boolean
|  |  +--rw session-aging-time?                uint16
|  |  +--rw long-connection
|  |  |  +--rw enable?   boolean
|  |  |  +--rw during?   uint16
|  |  +--rw policy-event-clause-agg-ptr*       instance-identifier
|  |  +--rw policy-condition-clause-agg-ptr*   instance-identifier
|  |  +--rw policy-action-clause-agg-ptr*      instance-identifier
```



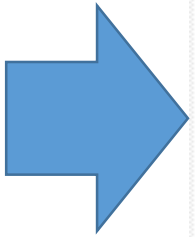
NEW:

```
module: ietf-i2nsf-policy-rule-for-nsf
+--rw i2nsf-security-policy
   +--rw system-policy* [system-policy-name]
      +--rw system-policy-name      string
      +--rw priority-usage          priority-usage-type
      +--rw rules* [rule-name]
      |  +--rw rule-name                          string
      |  +--rw rule-description?                  string
      |  +--rw rule-priority?                     uint8
      |  +--rw enable?                            boolean
      |  +--rw session-aging-time?                uint16
      |  +--rw long-connection
      |  |  +--rw enable?   boolean
      |  |  +--rw during?   uint16
```

Delete agg-ptr attributes

OLD:

```
module: ietf-i2nsf-policy-rule-for-nsf
+--rw i2nsf-security-policy
|  +--rw policy-name?                string
|  +--rw rules* [rule-name]
|  |  +--rw rule-name                                string
|  |  +--rw rule-description?                        string
|  |  +--rw rule-priority?                           uint8
|  |  +--rw enable?                                  boolean
|  |  +--rw session-aging-time?                      uint16
|  |  +--rw long-connection
|  |  |  +--rw enable?   boolean
|  |  |  +--rw during?   uint16
|  |  +--rw policy-event-clause-agg-ptr*             instance-identifier
|  |  +--rw policy-condition-clause-agg-ptr*         instance-identifier
|  |  +--rw policy-action-clause-agg-ptr*            instance-identifier
```



NEW:

```
module: ietf-i2nsf-policy-rule-for-nsf
+--rw i2nsf-security-policy
   +--rw system-policy* [system-policy-name]
      +--rw system-policy-name      string
      +--rw priority-usage          priority-usage-type
      +--rw rules* [rule-name]
      |  +--rw rule-name                          string
      |  +--rw rule-description?                  string
      |  +--rw rule-priority?                     uint8
      |  +--rw enable?                            boolean
      |  +--rw session-aging-time?                uint16
      |  +--rw long-connection
      |  |  ...
      |  +--rw time-zone
      |  |  ...
      |  +--rw event-clause-container
      |  |  ...
      |  +--rw condition-clause-container
      |  |  ...
      |  +--rw action-clause-container
      |     ...
```

Add policy-usage-type

NEW:

```
module: ietf-i2nsf-policy-rule-for-nsf
+--rw i2nsf-security-policy
   +--rw system-policy* [system-policy-name]
      +--rw system-policy-name      string
      +--rw priority-usage          priority-usage-type
      +--rw rules* [rule-name]
      |  +--rw rule-name                          string
      |  +--rw rule-description?                  string
      |  +--rw rule-priority?                     uint8
      |  +--rw enable?                            boolean
      |  +--rw session-aging-time?                uint16
      |  +--rw long-connection
      |  |  +--rw enable?   boolean
      |  |  +--rw during?   uint16
```

```
typedef priority-usage-type {
    type enumeration {
      enum priority-by-order {
          description
            "If priority type is order";
      }
      enum priority-by-number {
          description
            "If priority type is number";
      }
    }
    description
      "This is used for priority type.";
}
```

Next Steps

- We will add condition clause operator types such as exact-match, range-based, regex-based, and custom-match.

- We will change the data structure to accommodate other YANG data models, such as advanced NSFs (draft-dong-i2nsf-asf-config-01).

- We will change the current YANG data model to the YANG data model of Object-Oriented Style, such as Decorator patterns.

- After the proofreading by the authors of the NSF Capabilities Information Model document, we will correct the data model and finalize it.

- WG Last Call with this December.

Consumer-Facing Interface Data Model

(draft-ietf-i2nsf-consumer-facing-interface-dm-02)

IETF 103, Bangkok

November 7, 2018

Jaehoon (Paul) Jeong, Eunsoo Kim, Tae-Jin Ahn,
Rakesh Kumar, and Susan Hares

Updates from the Previous Version

- The following changes are made from:
  - draft-ietf-i2nsf-consumer-facing-interface-dm-01

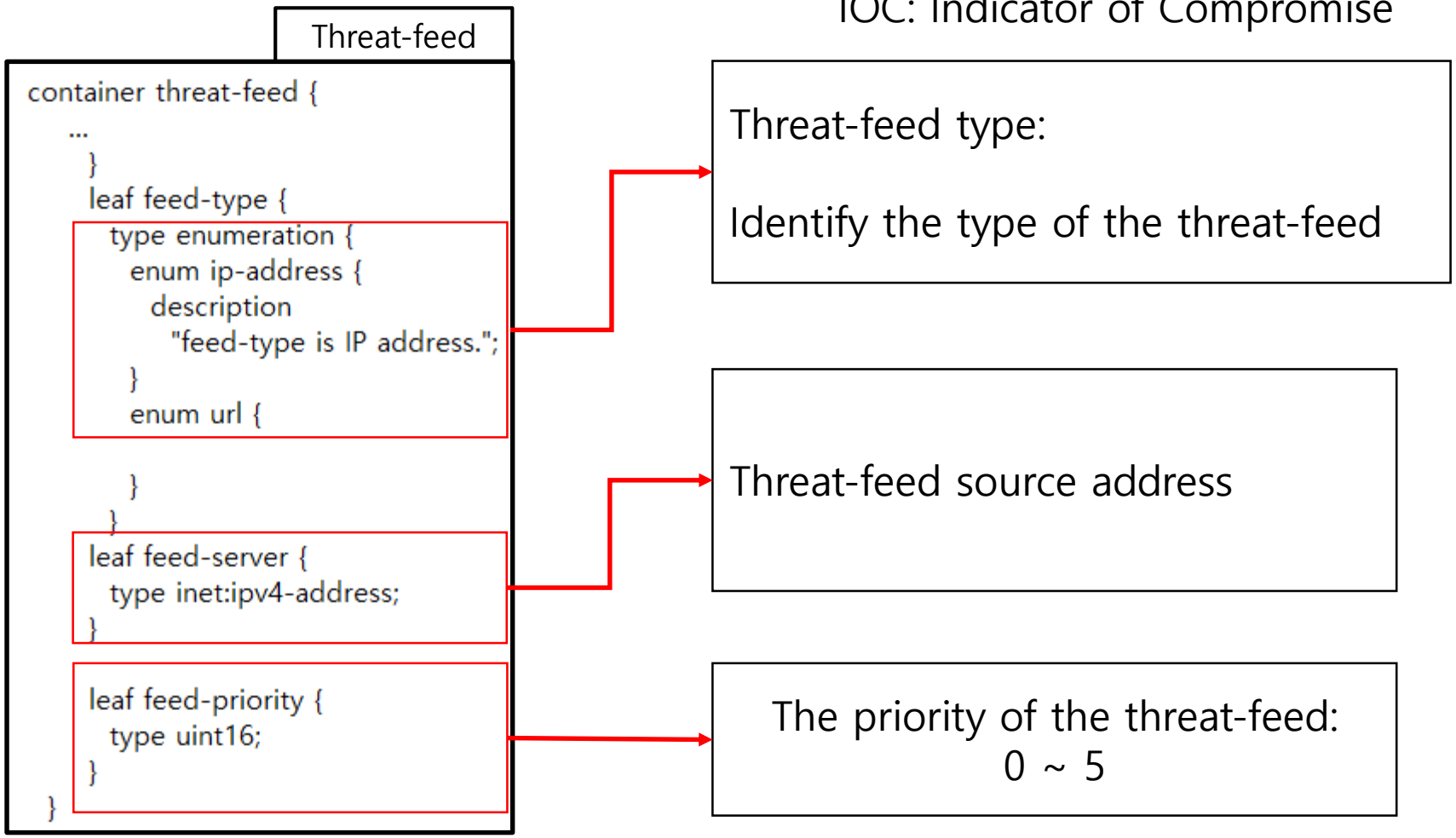
- Major Changes:
  - Included the sources for the threat-feed, such as STIX & TAXII for Structured Threat Information Expression and Relay.
  - Included descriptions on how those sources can be used.

- Minor Changes:
  - Correction of editorial mistakes (spelling, grammatical errors, etc.)

Major Changes

▪Modified threat-feed container so that it can support various threat related sources (e.g., **STIX** and **IOC**)

STIX: Structured Threat Information Expression
IOC: Indicator of Compromise



Next Steps

- We will improve the current YANG data model to the YANG data model of Object-Oriented Style, such as Decorator patterns.
  - Huawei (e.g., Liang (Frank) Xia) will provide us with a sample YANG data model using Decorator patterns.

- After the proofreading by the authors of the NSF Capabilities Information Models document, we will correct the data model and finalize it.

- WG Last Call with this December.

I2NSF Registration Interface Data Model
(draft-ietf-i2nsf-registration-interface-dm-01)

IETF 103, Bangkok

November 7, 2018

Sangwon Hyun, Jaehoon (Paul) Jeong,

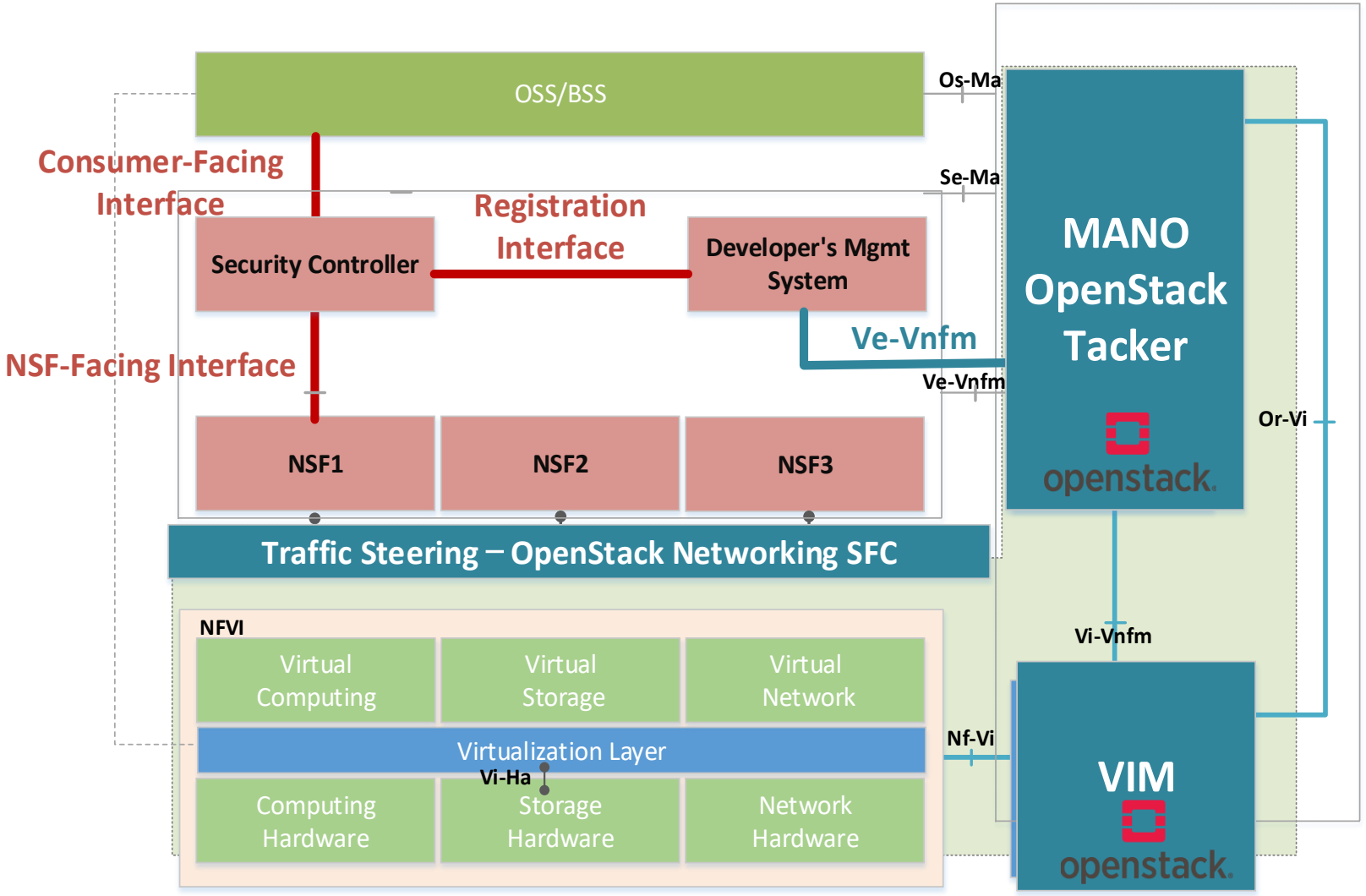
Taekyun Roh, Sarang Wi and Jungsoo Park

Updates from the Previous Version

- The Previous Draft:
  - draft-ietf-i2nsf-registration-interface-dm-00

- Changes from the Previous Version
  - The description of the operations performed over the Registration Interface has been revised with
    - register-select-instantiate operation sequence.
  - We revised Section 4 of the objectives of the registration interface to match the register-select-instantiate operation sequence.
  - The appendix has been added to clarify the Lifecycle Management of NSFs in I2NSF framework based on NFV.

NFV Reference Architecture for I2NSF



Architecture

- OS : Ubuntu 16.04
- NFV Infra : OpenStack Rocky release
- VNFM : OpenStack Tacker project
- Network : OpenStack Networking SFC

Interface

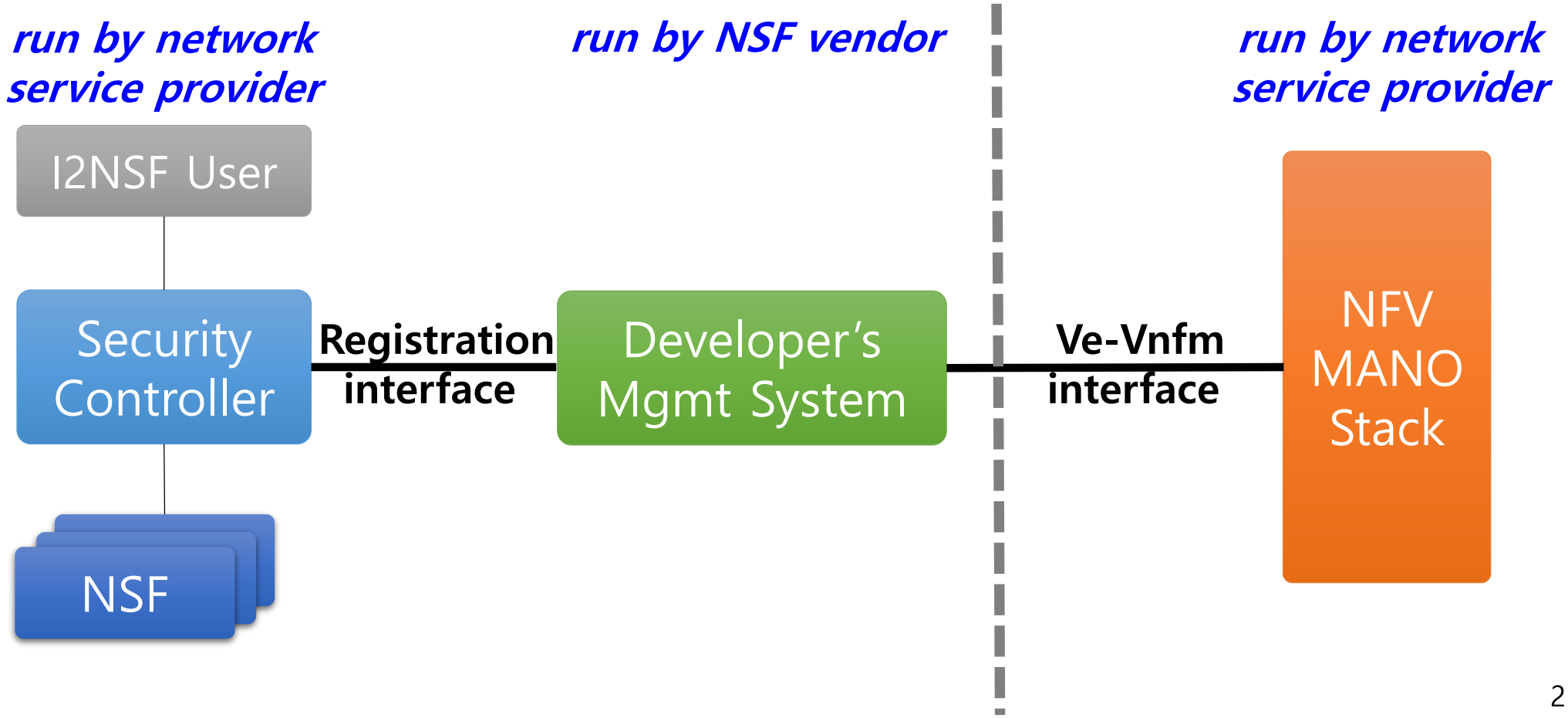
- Consumer-Facing Interface
- Registration Interface
- NSF-Facing Interface
- Ve-VNFM interface (RESTAPI)

Data Model

- VNFD : TOSCA Template
- VNFFG : TOSCA Template
- Data Modeling : Netconf YANG

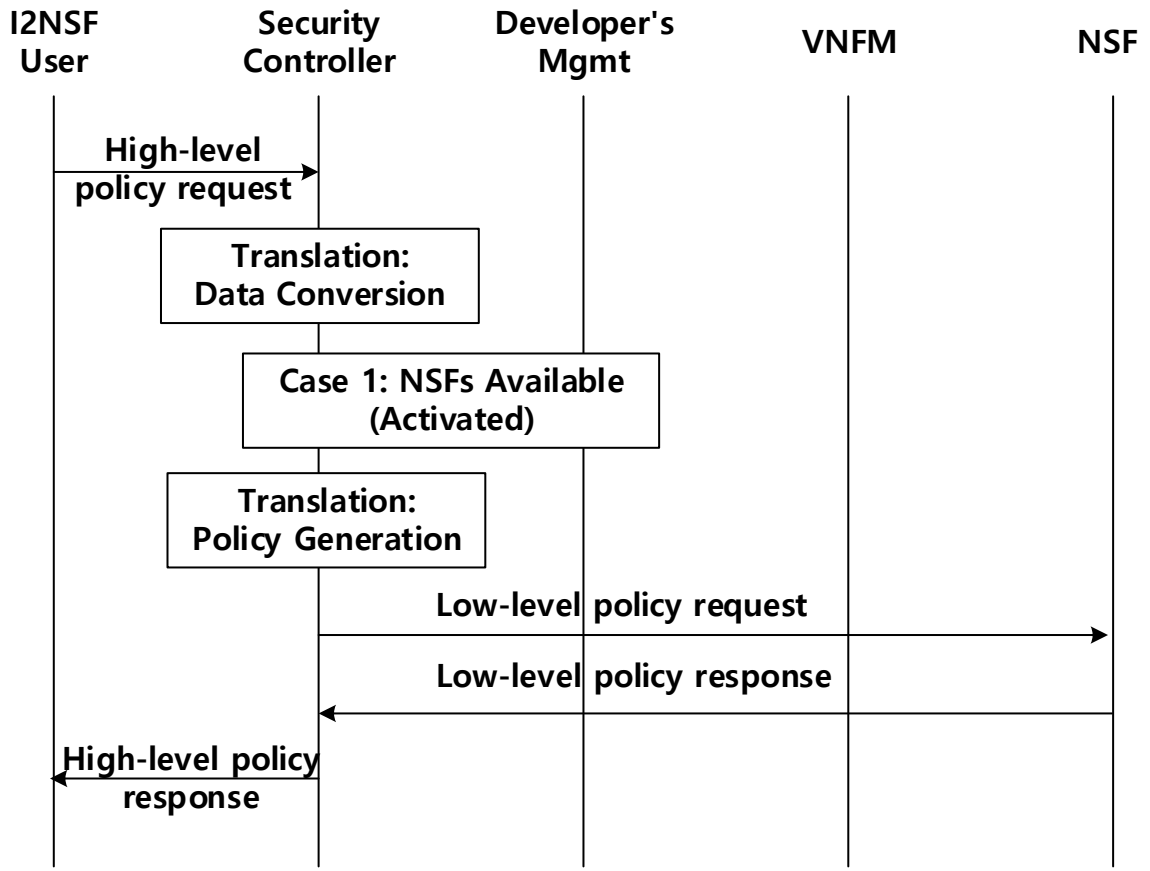
I2NSF Hackathon Project Implementation: Registration Interface in I2NSF with NFV

Source: H. Yang, Y. Kim, J. Jeong, and J. Kim, "**I2NSF on the NFV Reference Architecture**", **draft-yang-i2nsf-nfv-architecture-04**, Nov. 2018.

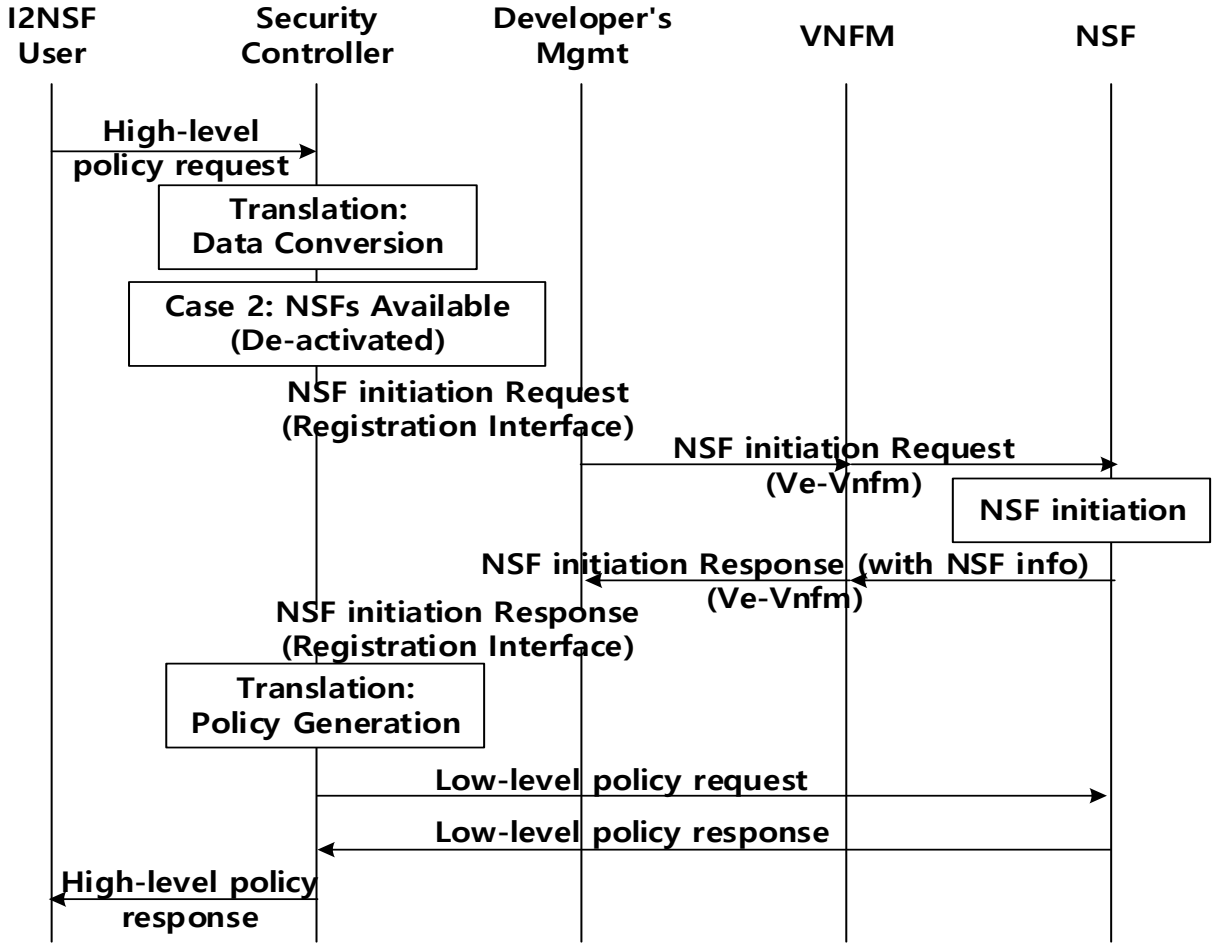


Scenario 1: NSF Available

- Case 1: NSF Activated

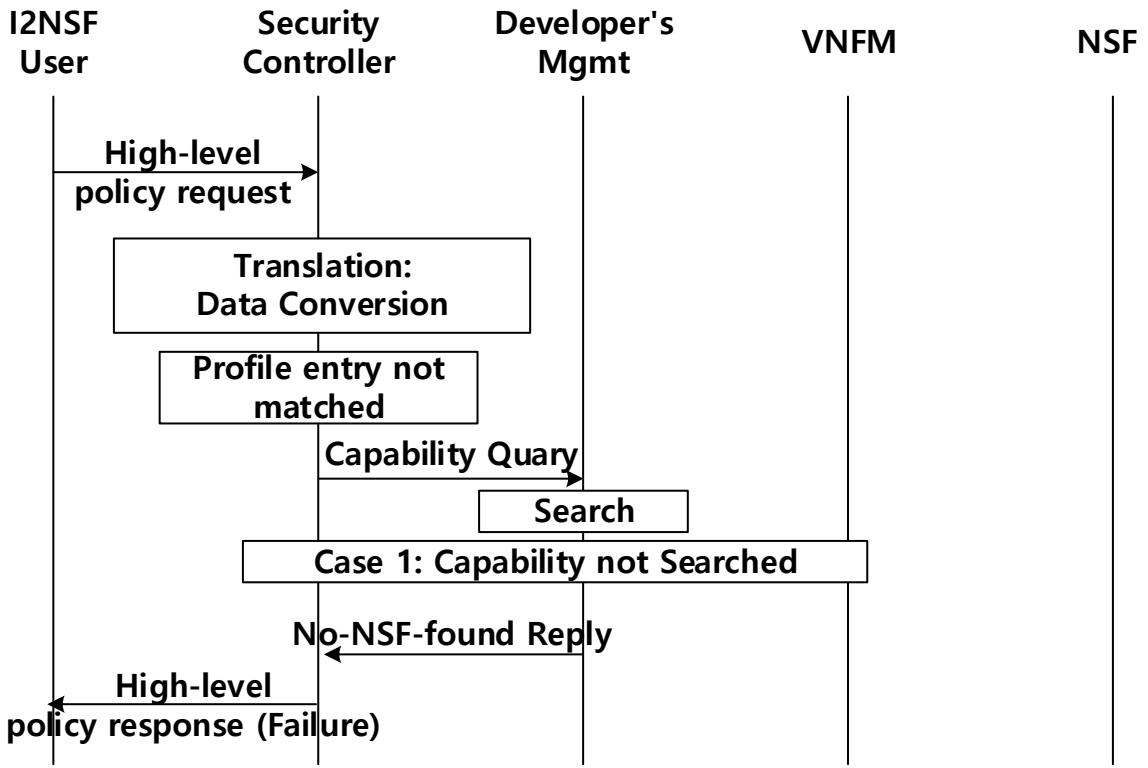


- Case 2: NSF De-activated

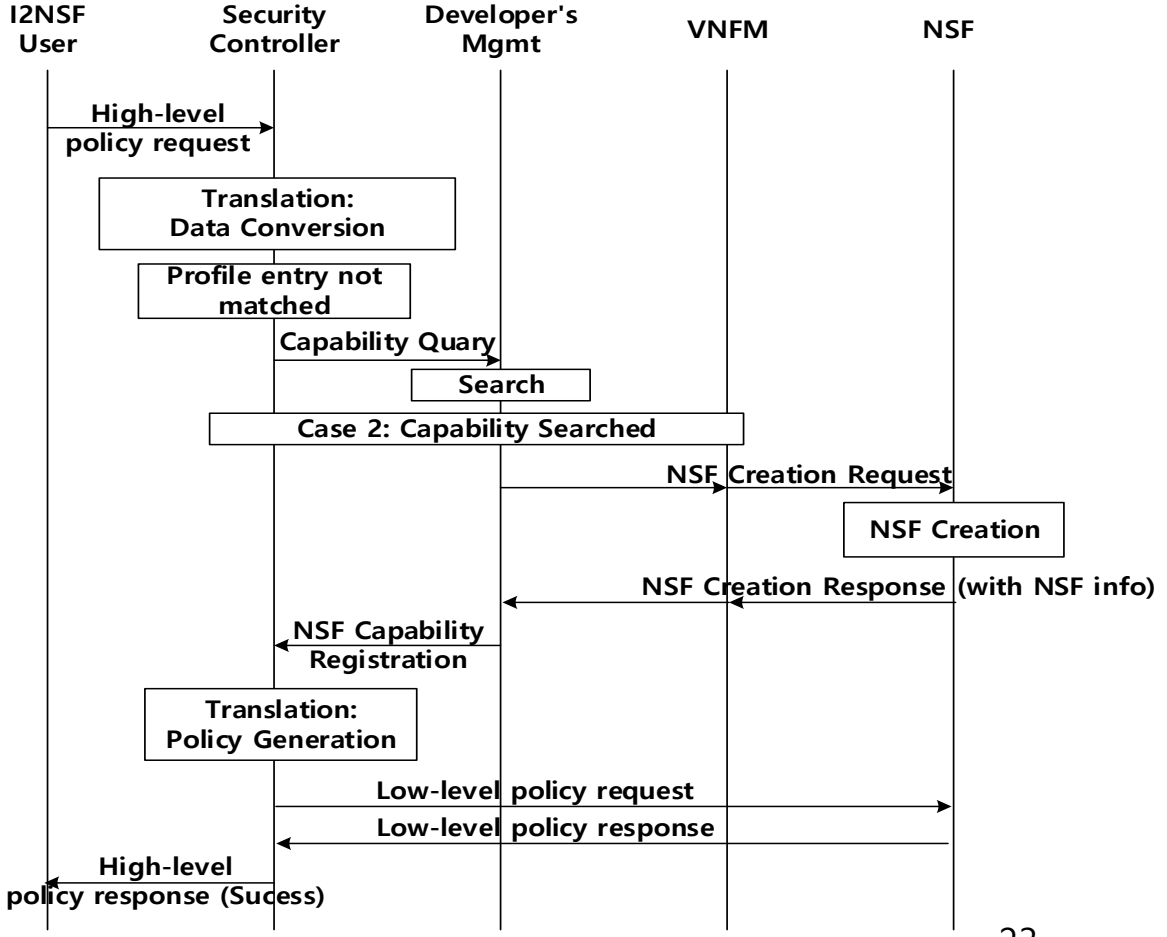


Scenario 2: NSF Unavailable

- Case 1: Capability not searched



- Case 2: Capability searched



Diego Lopez's Comments

- No direct, interactive communication between Security Controller and Developer's Management System (DMS) in NFV
  - [Answer] This I2NSF Hackathon Project has a direct, interactive communication between Security Controller and DMS via Registration Interface.

- Both Security Controller and DMS use Registration Interface to interact with NFV MANO Stack.
  - [Answer] This I2NSF Hackathon uses Ve-Vnfm Interface between DMS and VNFM in NFV MANO.

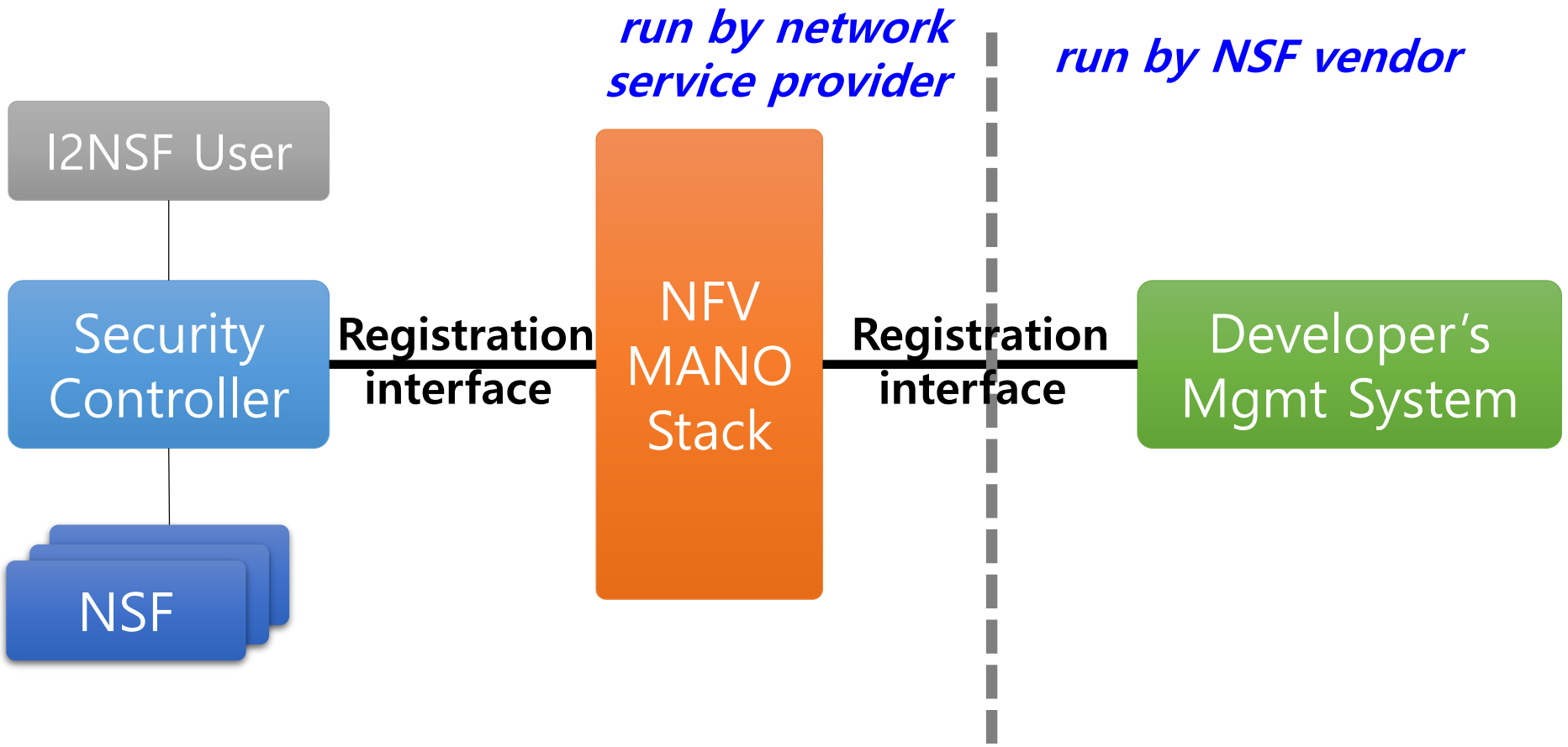
- Dynamic instantiation/de-instantiation of NSFs is out of the scope of this draft.
  - [Answer] We propose another draft about Lifecycle Management of NSFs:
    - H. Yang, Y. Kim, J. Jeong, and J. Kim, "I2NSF on the NFV Reference Architecture", draft-yang-i2nsf-nfv-architecture-04, Nov. 2018.

Usages of Registration Interface based on Diego's Comments.

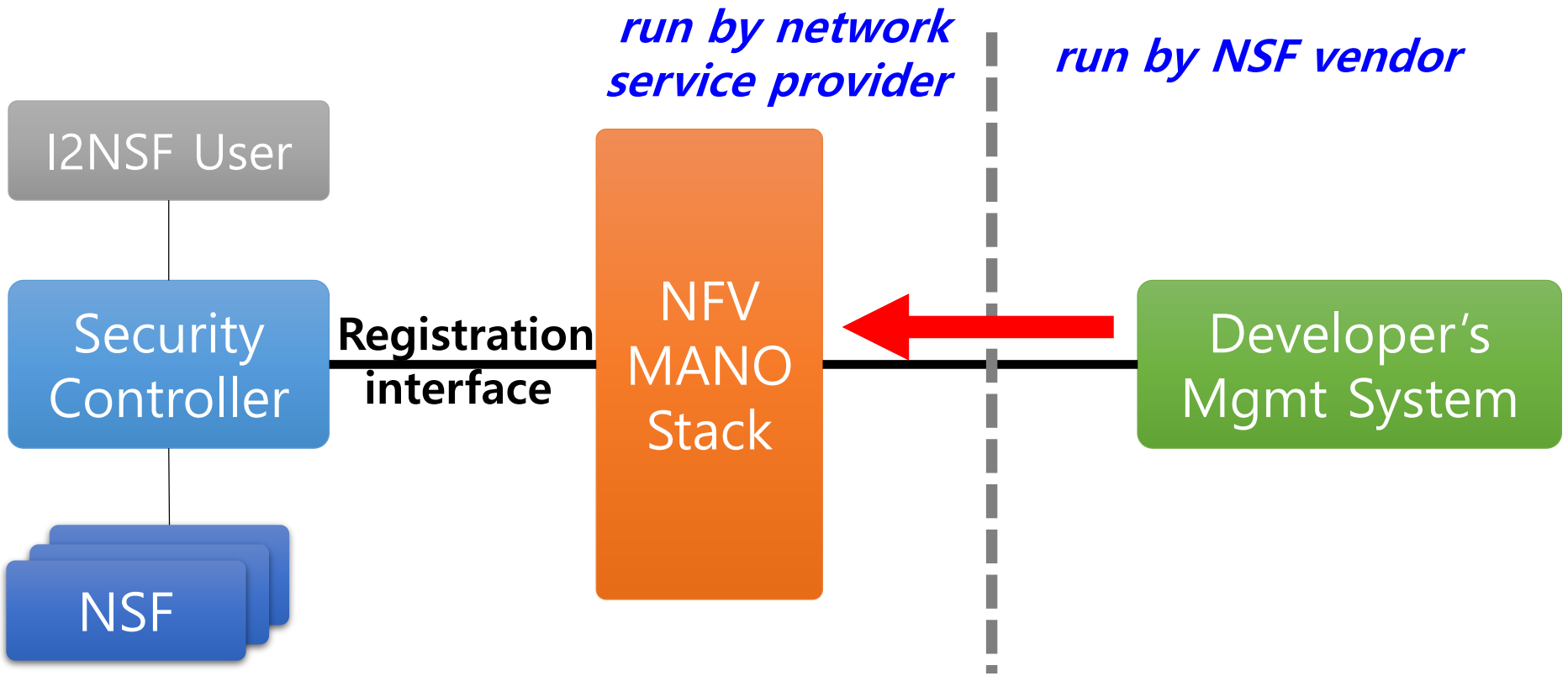
- Developer's Management System's Use of Registration Interface
  - Registering NSFs and their capabilities into NFV MANO
  - Updating the capabilities of the registered NSFs

- Security Controller's Use of Registration Interface
  - Retrieving the catalog of NSFs from NFV MANO
  - Requesting NFV MANO to instantiate NSFs

Registration Interface in I2NSF with NFV (1/4)

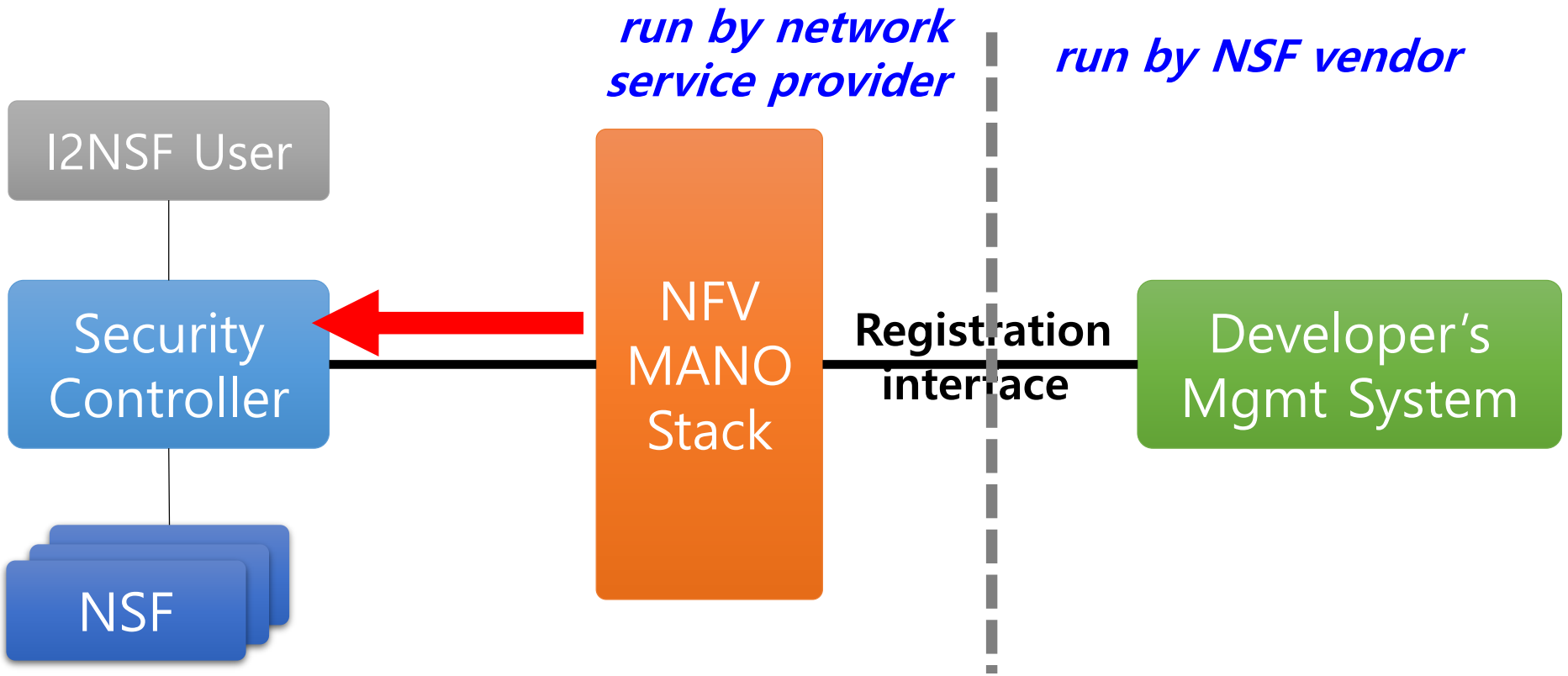


Registration Interface in I2NSF with NFV (2/4)



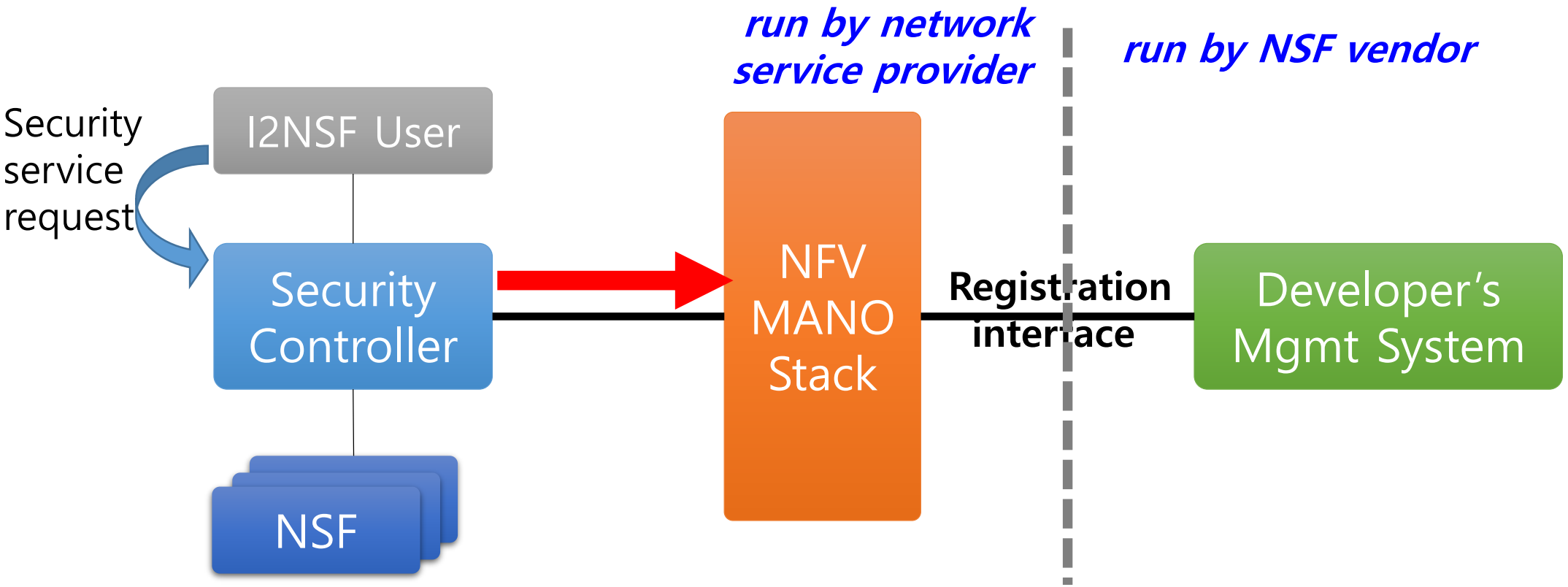
- DMS uses the registration interface to provide NSFs and update the capabilities of the NSFs provided to SC.
  - MANO then creates a catalog of available NSFs and their capabilities that have been registered by DMSs.

Registration Interface in I2NSF with NFV (3/4)



- NFV MANO provides SC with the catalog of NSFs and their capabilities through the registration interface.

Registration Interface in I2NSF with NFV (4/4)



- SC searches the catalog for NSFs required to serve the request received from the I2NSF user.
- SC makes a selection of NSFs on the catalog.
- SC requests MANO to instantiate the select NSFs via the registration interface.

Next Steps

- We will change the current YANG data model to the YANG data model of Object-Oriented Style, such as Decorator patterns
  - Huawei will provide us with a sample YANG data model using Decorator patterns.

- After the proofreading by the authors of the NSF Capabilities Information Models document, we will correct the data model and finalize it.

- WG Adoption for our Draft about NSF Lifecycle Management:
  - **draft-yang-i2nsf-nfv-architecture-04**