SDN-Based Security Services using I2NSF

draft-jeong-i2nsf-sdn-security-services-04

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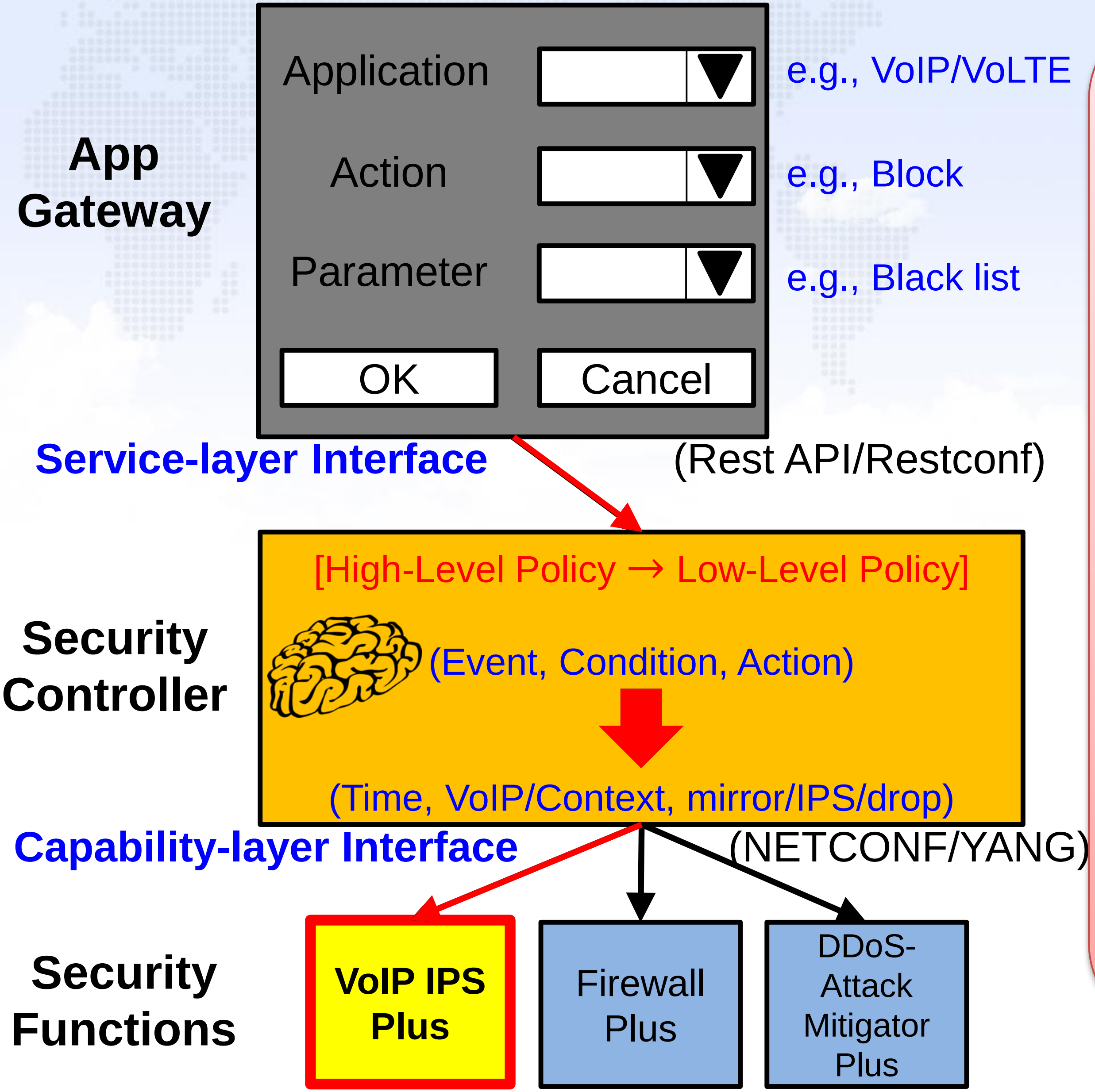
ETRI kt

Updates of Version -04

- Korea Telecom (KT) joined as co-authors.
  - Tae-Jin Ahn and Se-Hui Lee
- A new use case is added as the third one.
  - VoIP/VoLTE
  - Note: Version -03 had two use cases:
    - Firewall
    - DDoS mitigator
- Two new requirements for VoIP/VoLTE are added:
  - To support the seamless services to mitigate network attacks.
  - To provide the dynamic control of network resources to mitigate network attacks.

I2NSF Architecture for VoIP IPS (1/2)



App Gateway

Application ▼ e.g., VoIP/VoLTE

Action ▼ e.g., Block

Parameter ▼ e.g., Black list

OK Cancel

Service-layer Interface (Rest API/Restconf)

Security Controller

[High-Level Policy → Low-Level Policy]

(Event, Condition, Action)

(Time, VoIP/Context, mirror/IPS/drop)

Capability-layer Interface (NETCONF/YANG)

Security Functions

VoIP IPS Plus

Firewall Plus

DDoS-Attack Mitigator Plus

Development Environment

<Platform>
OS: Linux-Ubunt-14.0

<App Gateway>
Language: Javascript, html, xml

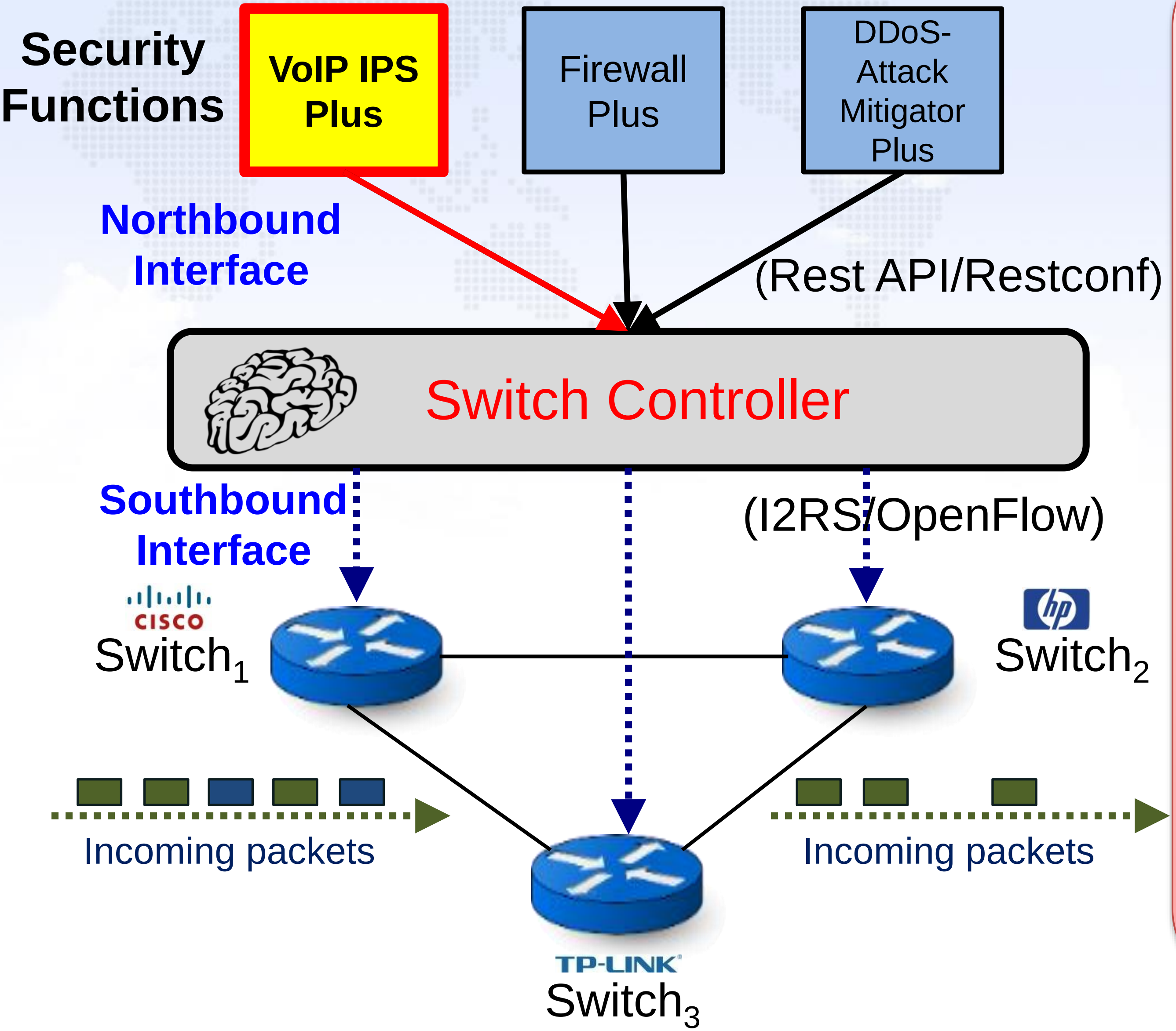
<Security Controller>
Language: Python

<Security Functions>
C Language

<App Gateway-Security Controller Interface>
Rest API

<Security Controller-Security Function Interface>
NETCONF/YANG

I2NSF Architecture for VoIP IPS (2/2)



Security Functions

VoIP IPS Plus

Firewall Plus

DDoS-Attack Mitigator Plus

Northbound Interface

(Rest API/Restconf)

Switch Controller

Southbound Interface

(I2RS/OpenFlow)

Development Environment

<Security Functions>
VoIP IPS Plus: C Language
Firewall Plus: C Language
DDoS-Attack Mitigator Plus: C language

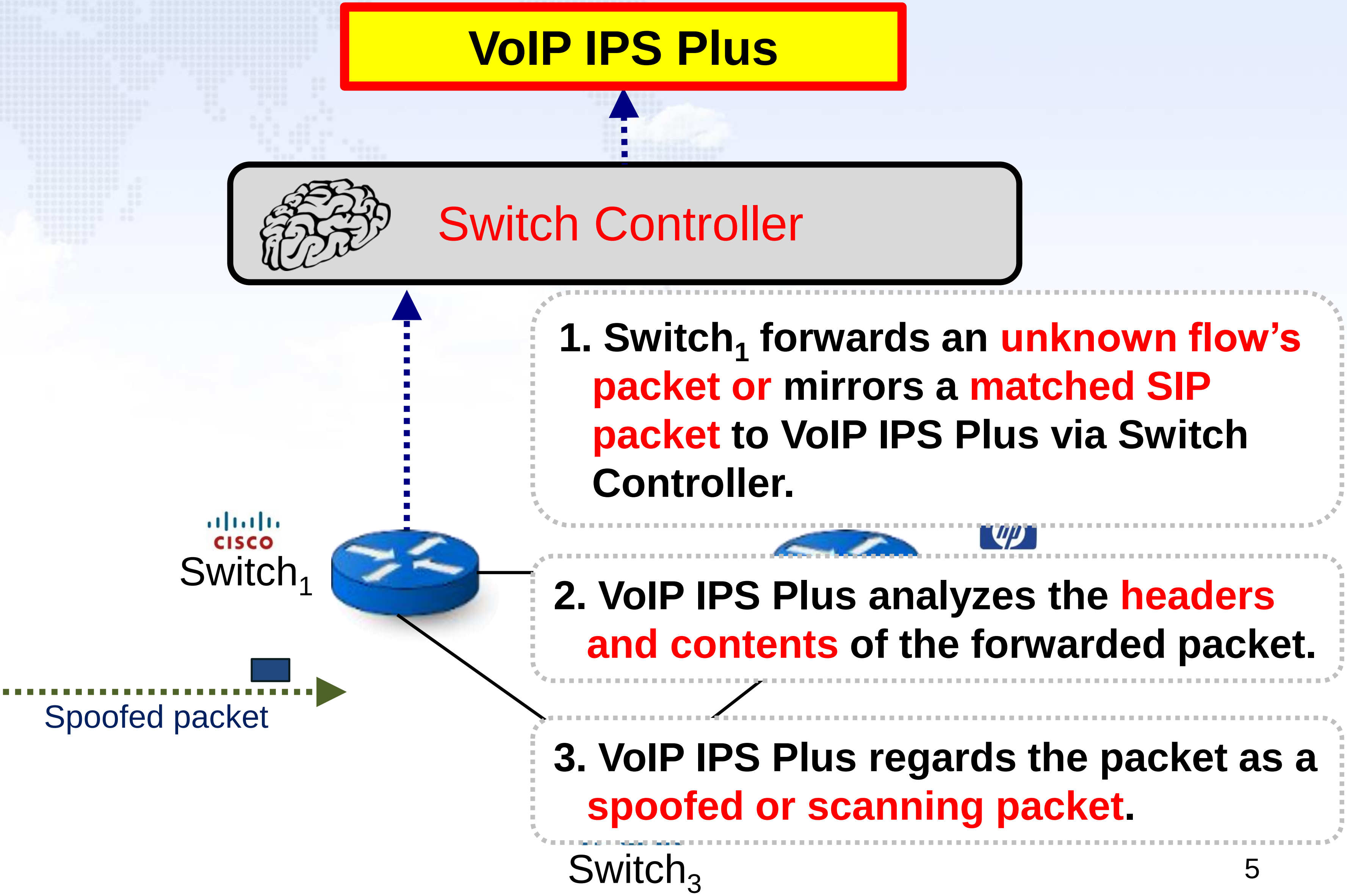
<Switch Controller>
Construction using OpenDaylight

<Switches>
Construction using Mininet

<Security Function-Switch Controller Interface>
Rest API

<Switch Controller-Switch Interface>
OpenFlow

Centralized VoIP/VoLTE System (1/2)



VoIP IPS Plus

Switch Controller

Switch$_1$

Spoofed packet

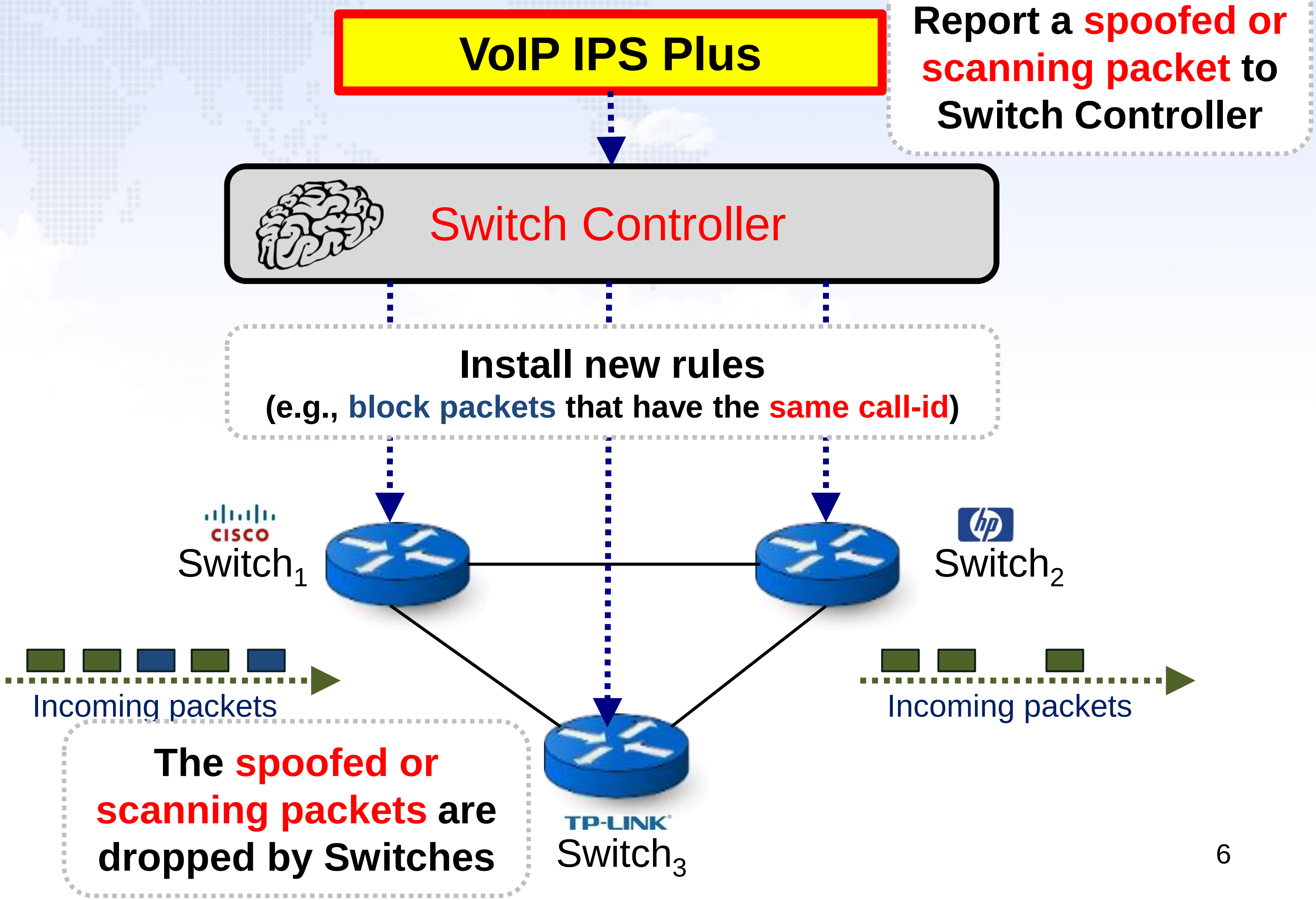
Switch$_3$

1. Switch$_1$ forwards an **unknown flow's packet or** mirrors a **matched SIP packet** to VoIP IPS Plus via Switch Controller.

2. VoIP IPS Plus analyzes the **headers and contents** of the forwarded packet.

3. VoIP IPS Plus regards the packet as a **spoofed or scanning packet**.

Centralized VoIP/VoLTE System (2/2)



VoIP IPS Plus

Report a **spoofed or scanning packet** to Switch Controller

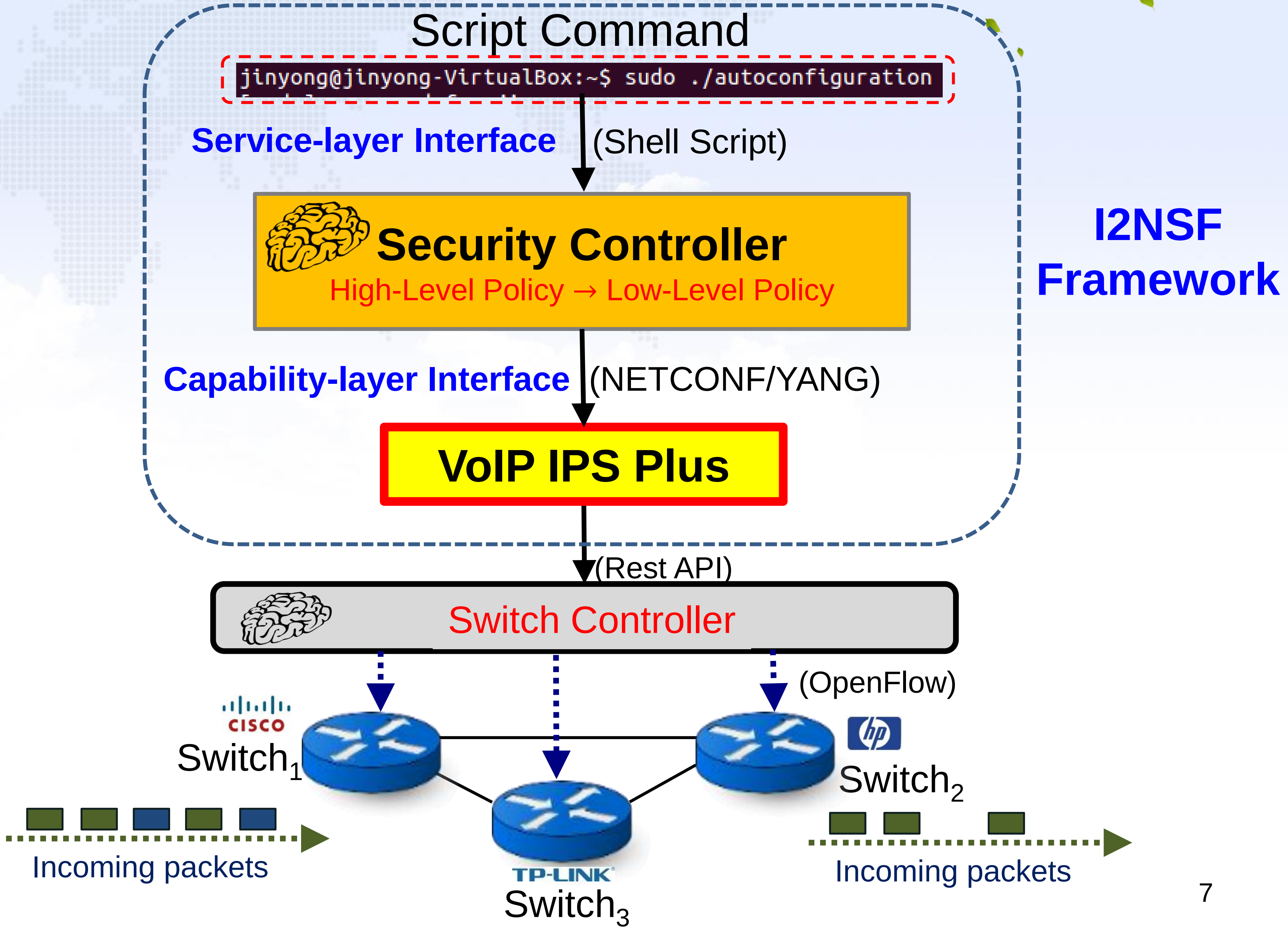
Switch Controller

Install new rules

(e.g., block packets that have the same call-id)

The **spoofed or scanning packets** are dropped by Switches

Implementation based on OpenDaylight



```
jinyong@jinyong-VirtualBox:~$ sudo ./autoconfiguration
```

Next Steps for this Draft

- Provisioning of the **Information Model** (and **Data Model**) needed for the VoIP/VoLTE for Security Controller, i.e.,
  - the **Service-layer Interface** between App Gateway (for VoIP/VoLTE) and Security Controller, and
  - the **Capability-layer Interface** between Security Controller and VoIP IPS Plus (as security function).

- **Proto-type Implementation** of VoIP/VoLTE in I2NSF Framework with SDN/NFV