

Upgrading KOREN to Global Virtual Infrastructure

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Testbed Federation

- Ongoing work with EU FP7 project partners to Federate KOREN resources with International testbed
- Each partners' resources will be visible, manageable, usable from federated partners and their clients
- Resource status and statistical data will be compatible



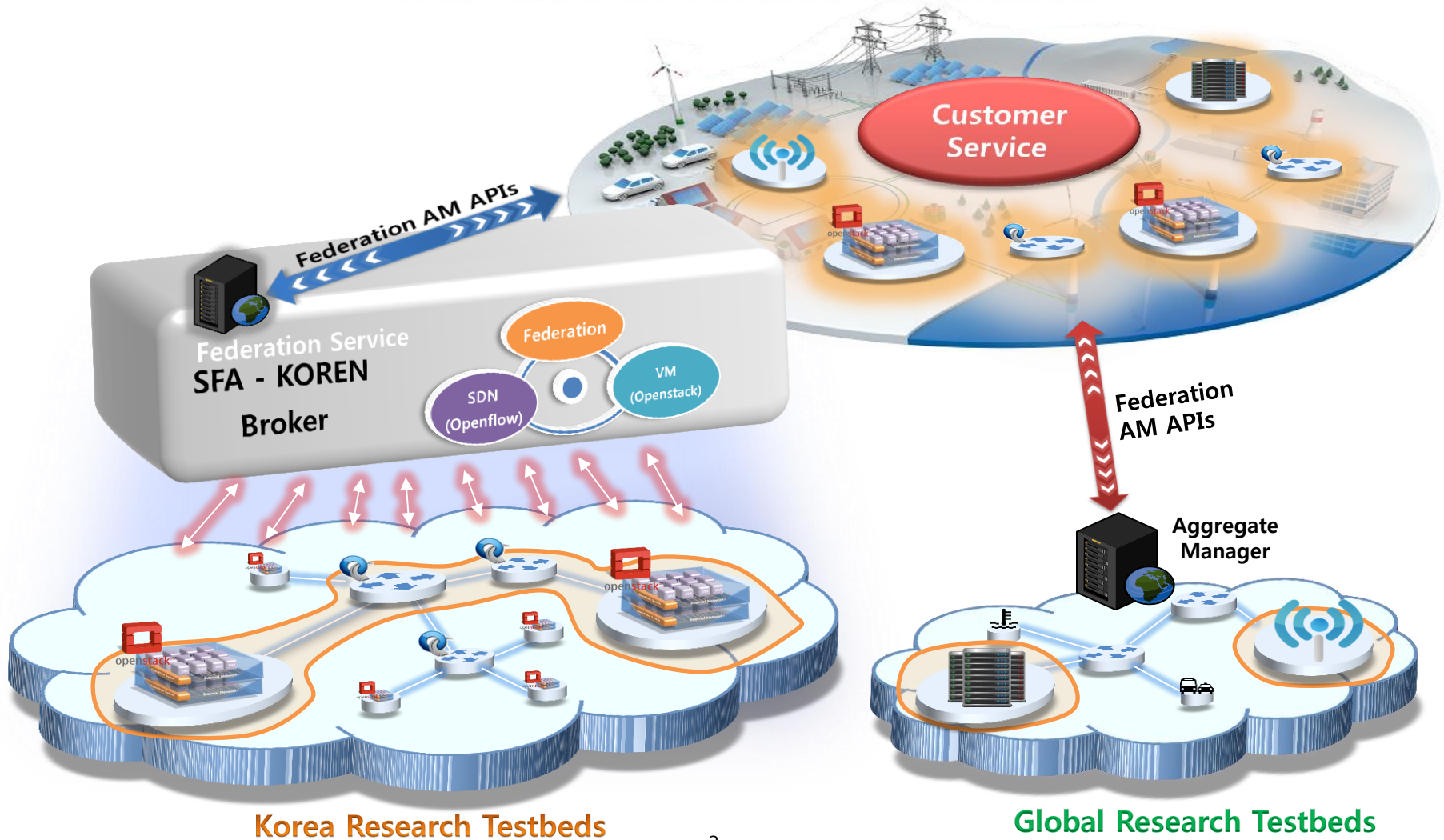
Partners

- IP project coordinated by iMinds
- 10/2012 - 9/2016

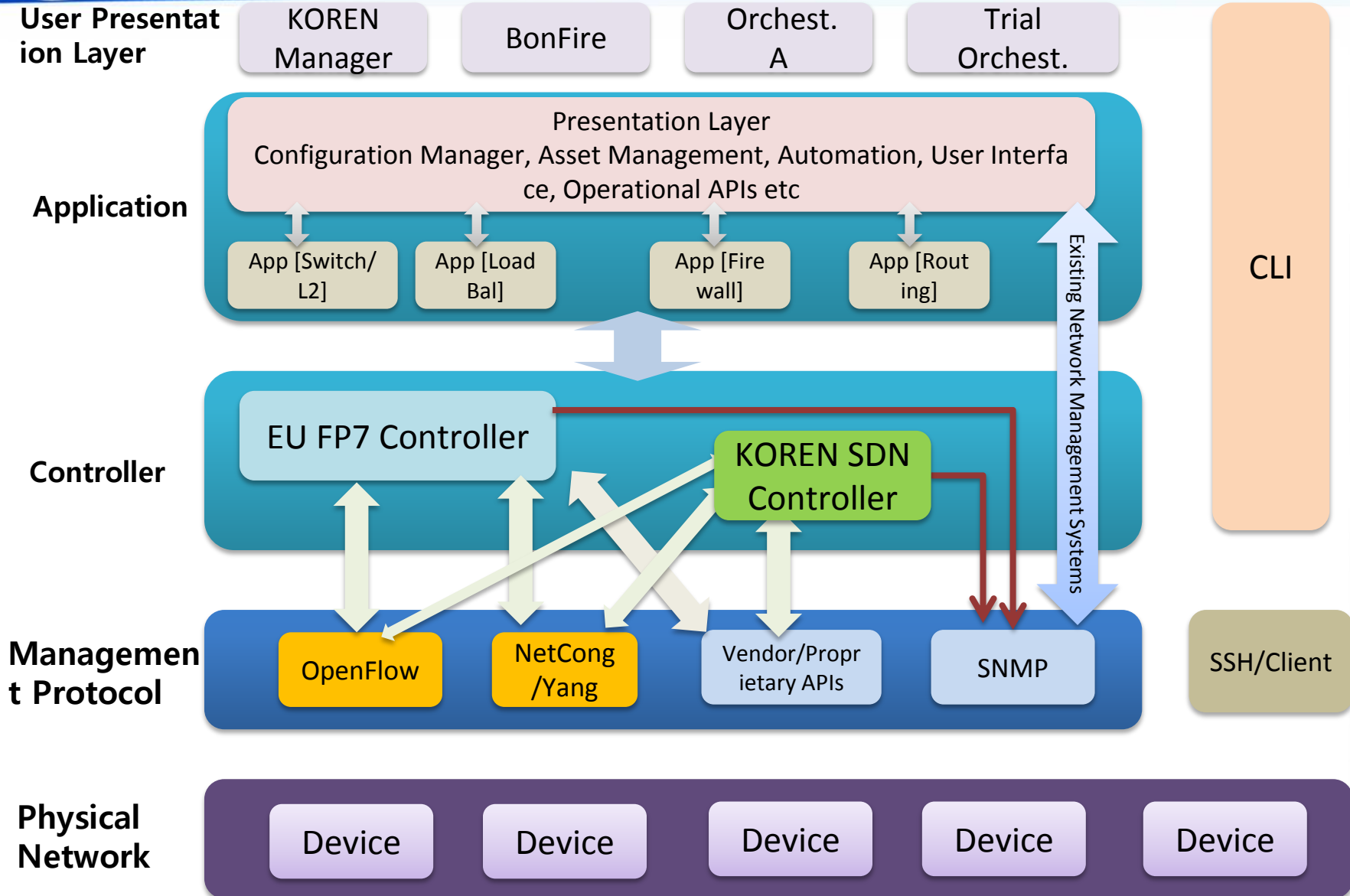


1. Overview

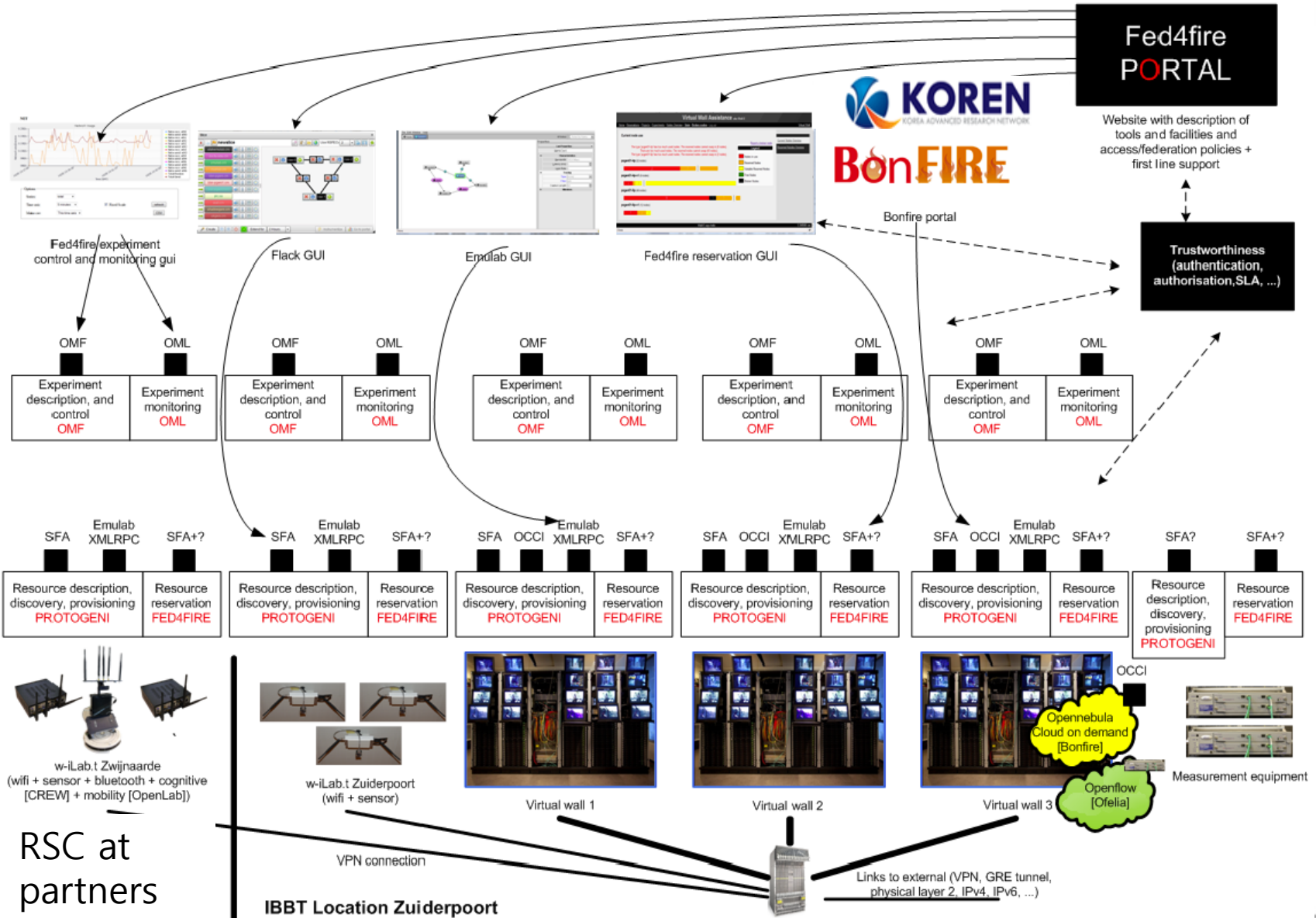
KOREN SDN/Cloud Testbed to connect to International Testbed: Federation



Architecture:

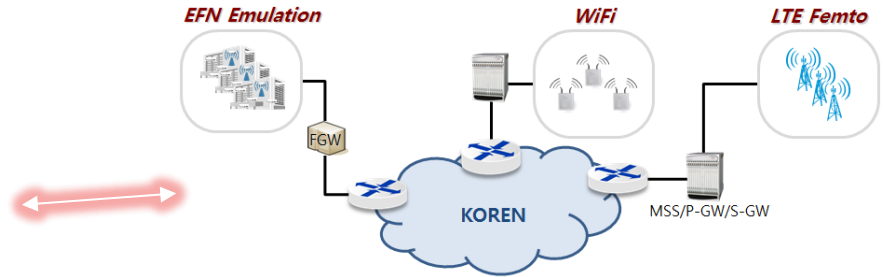
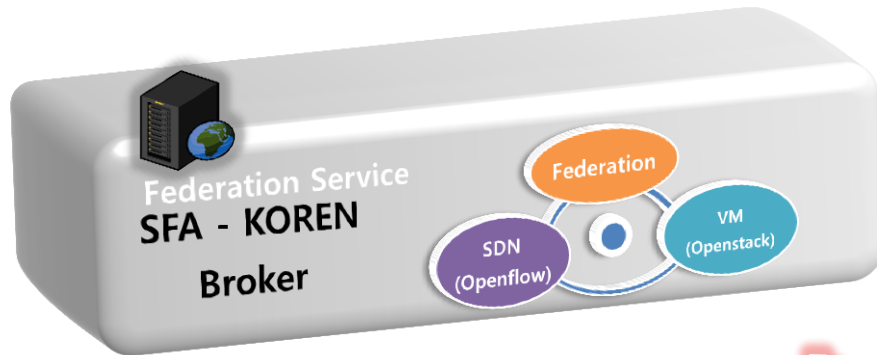


Example: Federation with Partners

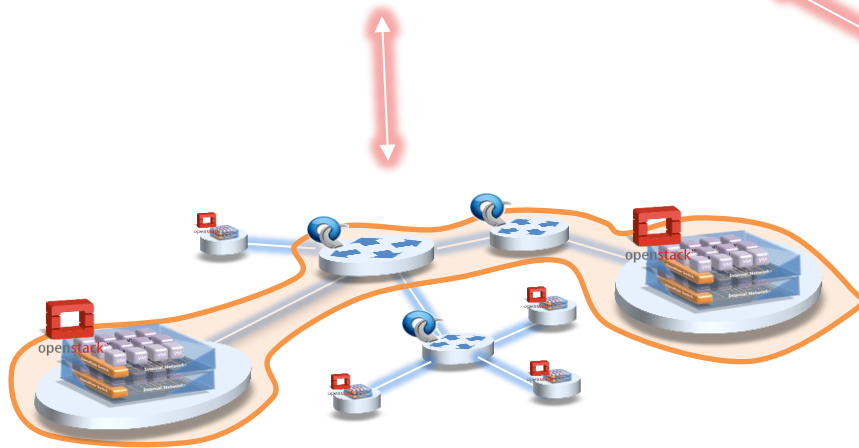


But we have to implement these:

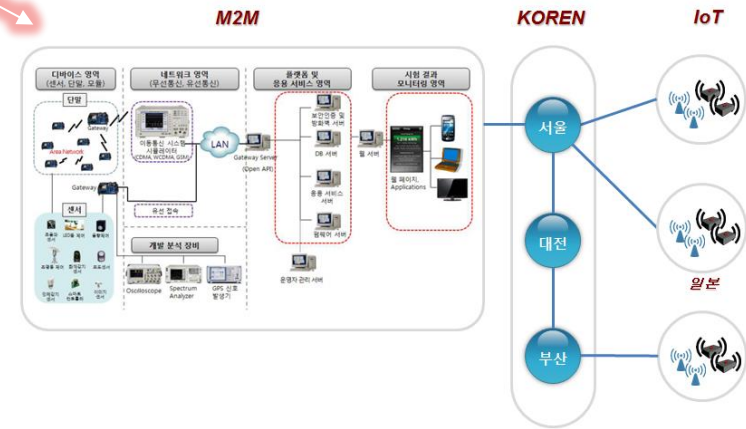
- Lack of Standard description and management system make federation difficult



LTE/WIFI Infra



SDN/Cloud Infra



M2M Infra

KOREN Virtual Infra



II. Research

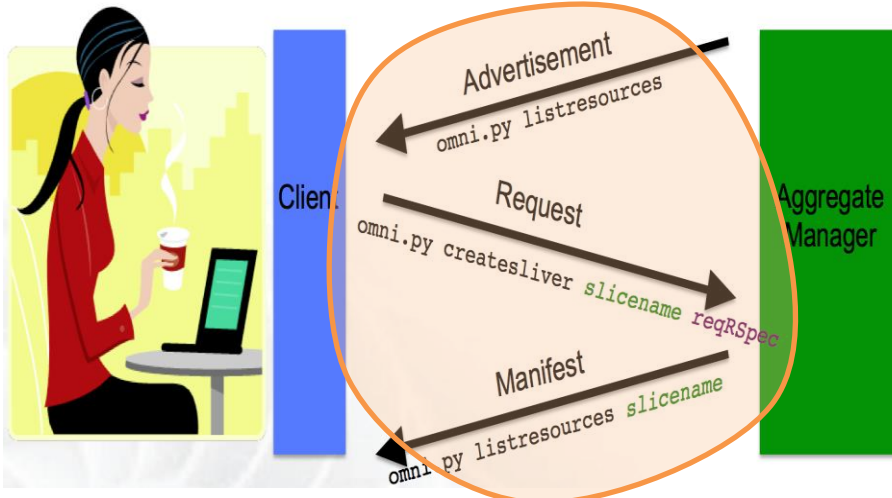
1. **KOEWN SFA Wrapper**
2. **Cloud Management SW**
3. **KOREN SDN/Cloud Broker**
4. **Trestbed**

Rspec

- XML based global description: XML is flexible so you have to make an agreed upon descriptions
- International efforts are going on to make compatible APIs (mostly GENI lead efforts)

● Rspec Types

- Advertisement
- Request
- Manifest



```
<?xml version="1.1" encoding="UTF-8"?>
<rspec xmlns="http://www.geni.net/resources/rspec/3"
xmlns:xs="http://www.w3.org/2001/XMLSchema-instance"
xmlns:openflow="http://www.geni.net/resources/rspec/ext/openflow/3"
xs:schemaLocation="http://www.geni.net/resources/rspec/3
http://www.geni.net/resources/rspec/3/request.xsd
http://www.geni.net/resources/rspec/ext/openflow/3
http://www.geni.net/resources/rspec/ext/openflow/3/of-resv.xsd"
type="request">
  <openflow:sliver description="My awesome experiment that you should opt-in
because
I'm awesome."
email="john.doe@example.net"
ref="http://wiki.example.net/myproject">
    <openflow:controller url="tcp:controller.example.net:6633" type="primary" />
    <openflow:controller url="tcp:controller.example.net:6634" type="monitor" />
    <openflow:controller url="tcp:backup.example.net:6633" type="backup" />
    <openflow:group name="johngrp">
      <openflow:datapath
component_id="urn:publicid:IDN+openflow:foam:foam.example.net+datapath+00:0
0:00:00:00:
00:00:09" component_manager_id="urn:publicid:IDN+openflow:foam:foam.example.
net+authority+am">
        <openflow:port num="1" name="GBE0/1" />
        <openflow:port num="2" name="GBE0/2"/>
        <openflow:port num="3" name="GBE0/3"/>
        <openflow:port num="4" name="GBE0/4"/>
      </openflow:datapath>
      <openflow:datapath
component_id="urn:publicid:IDN+openflow:foam:foam.example.net+datapath+00:0
0:00:00:00:
00:00:0a" component_manager_id="urn:publicid:IDN+openflow:foam:foam.example.
net+authority+am">
        <openflow:port num="1" />
        <openflow:port num="2" />
        <openflow:port num="3" />
      </openflow:datapath>
    </openflow:group>
    <openflow:group name="janegrp">
      <openflow:datapath
component_id="urn:publicid:IDN+openflow:foam:foam.example.net+datapath+00:0
0:00:00:00:
00:00:0b" component_manager_id="urn:publicid:IDN+openflow:foam:foam.example.
net+authority+am">
        <openflow:port num="1" />
```

KOREN Virtual Infra Standard Wrapper

- SFAWrapper based extended plugin to OpenStack
- SFAWrapper based extended plugin to FOAM
 - FOAM is being extended (previously it was just a web front)

1. GENI API : ListResource

2. Nova API : list flavour

3. NOVA json response

```
{
  "flavors": [{"id": "1",
               "links": [ .....
               ],
               "name": "m1.tiny",
               "os-flavor-access:is_public": true, }
}
```

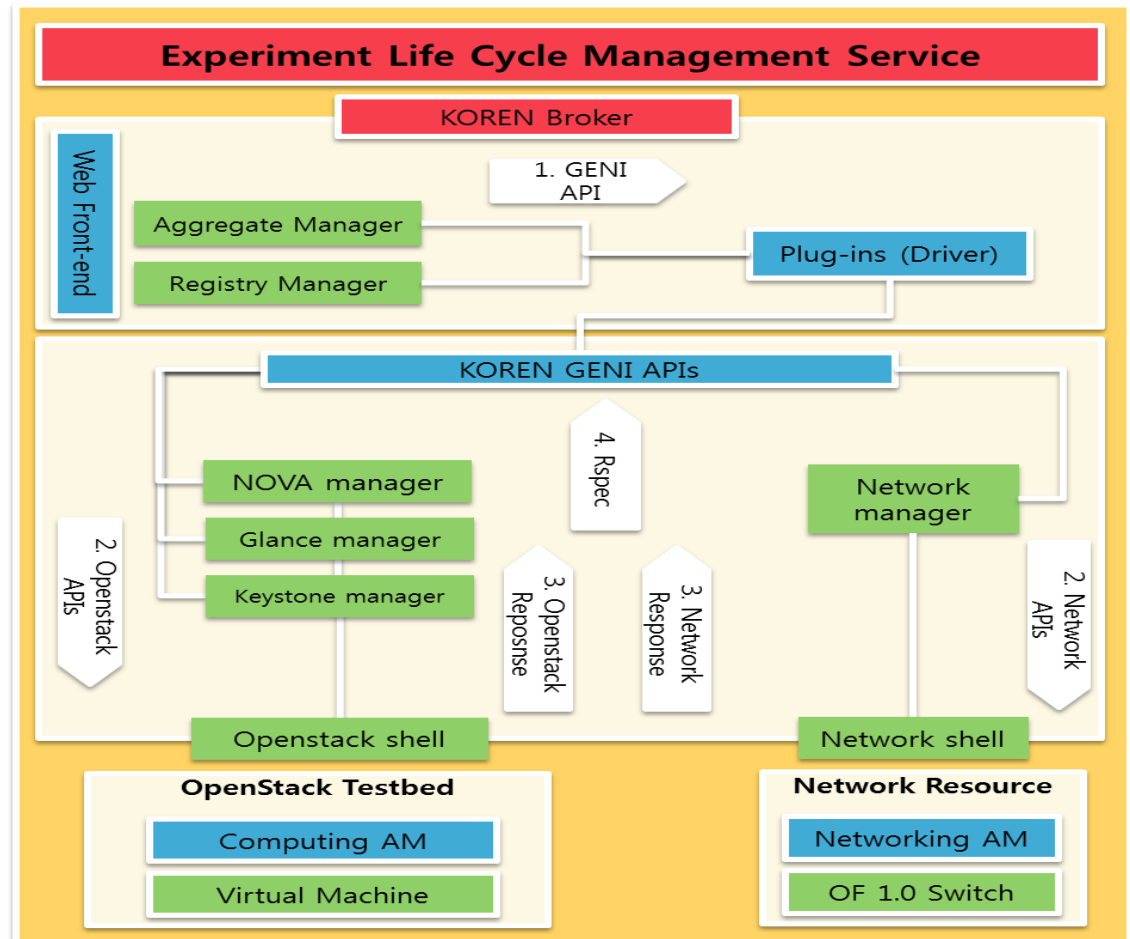
2. SDN API : ListResource

3. SDN json response

```
{
  "datapath": [{"component id": "
urn:publicid:IDN+openflow:koren:yonseidatapath+05:00:00:00:00:00:01",
               " component_manager_id": "...
               .... }
}
```

4. GENI API reponse

```
<rspec expires="2014-..." type="advertisement"
xmlns="https://github.com/koren..." ...>
  <openflow:datapath
  component_id=
  "urn:publicid:IDN+openflow:koren:yonseidatapath+05:00:00:00:00:00:01"
  component_manager_id=
  "urn:publicid:IDN+openflow:koren:yonseidatapath+05:00:00:00:00:00:01">
    <openflow:port name="GBE0/5" num="5"/>
    <openflow:port name="GBE0/6" num="6"/>
  </openflow:datapath>
  <sliver_type name="m1.tiny" cpus="1"
  memory="512" storage="1">
    <disk_image name="cirros-0.3.1-x86_64-uec"
  os="cirros-0.3.1-x86_64-uec" version="cirros-0.3.1-x86_64-uec" description="cirros-0.3.1-x86_64-uec"/>
  </sliver_type>
</rspec>
```



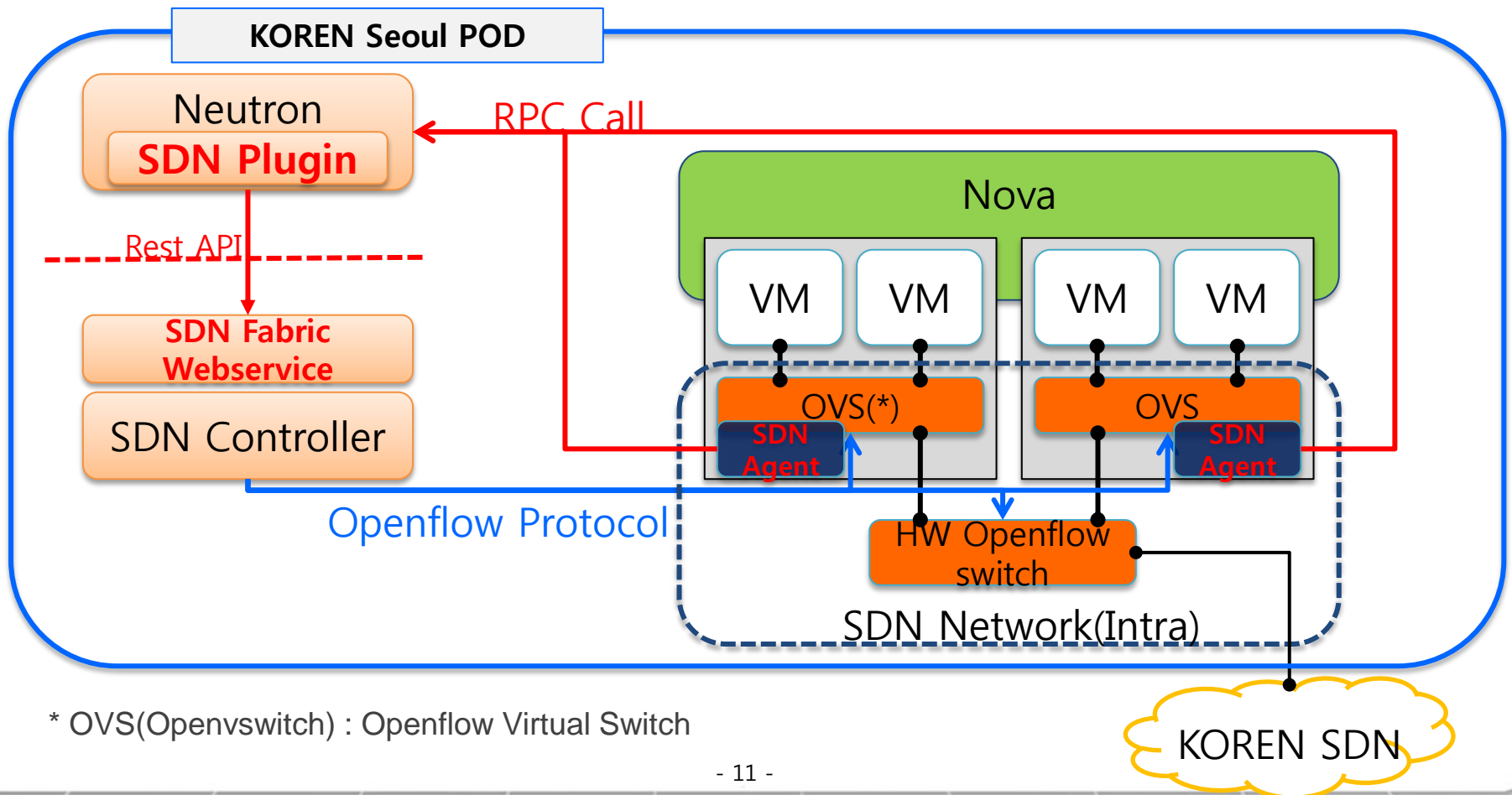


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SDN Enabled Management

- SDN/OpenStack based **Cloud Management** system and **SDN Infra management** system
- Development of **Orchestration Application** that connects OpenStack and OF WAN Interface (extension of OpenStack)



SDN WAN Extended Fabric– SDN eXchange

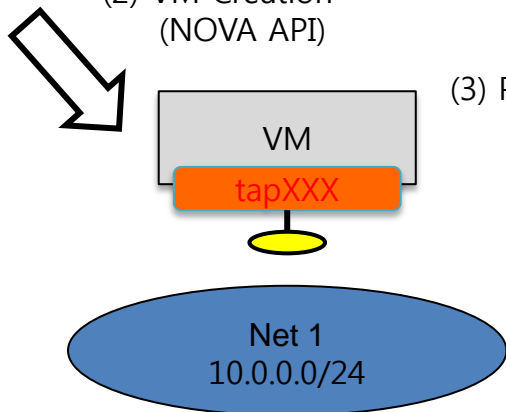
- **Extension of SDN Orchestration**

- IP resource allocation between Tenants
- Routing between VM
 - ✓ No Spanning Tree Protocol
 - ✓ No possibility of storm
- Fault-tolerance
 - ✓ Link fast failover

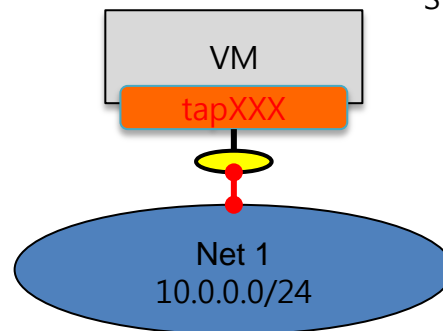
(1) Virtual Network Creation (Quantum API)



(2) VM Creation (NOVA API)

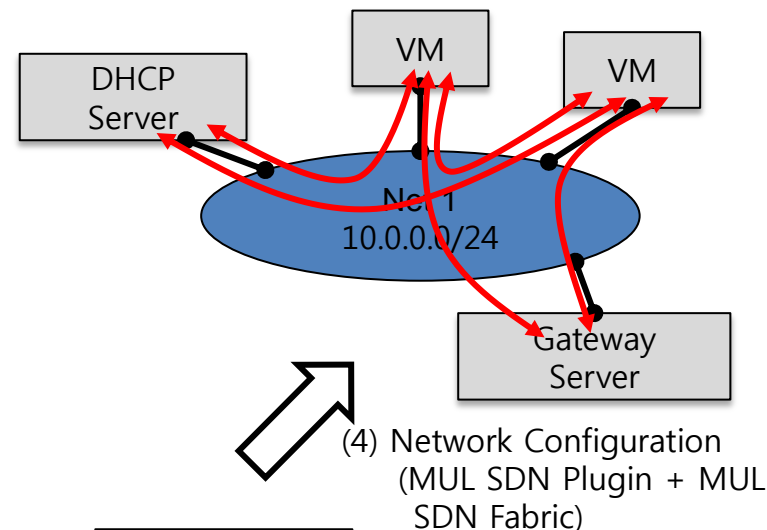


(3) Port Attachment (SDN Agent)



- **Extension of SDN Application**

- SDN NBAPI for remote orchestrator from federated partners



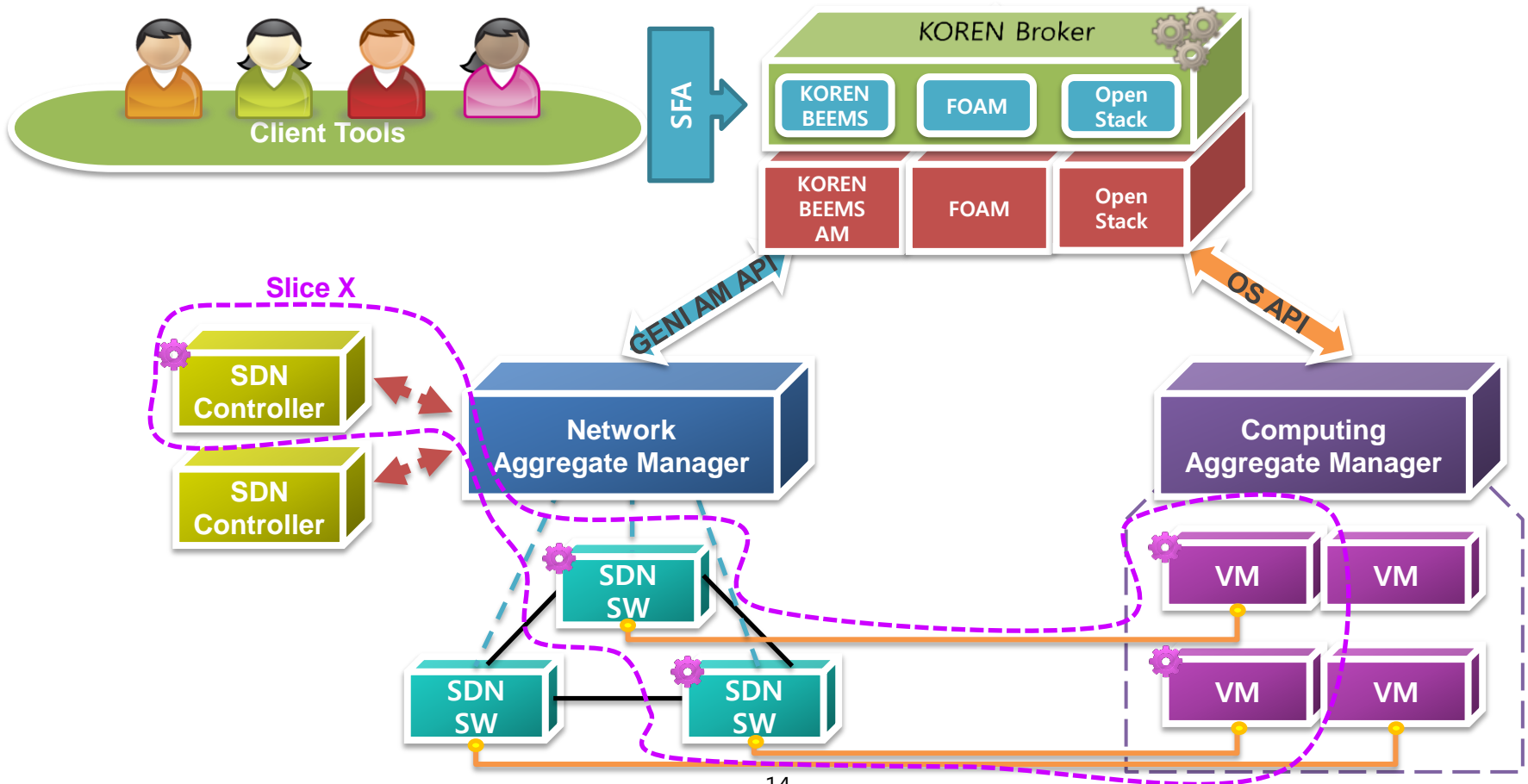


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KOREN SDN/Cloud Resource Broker

- Computing Resource (NOVA, PlanetLab etc) Broker
- Network resource broker
- CPU & Network resource matching service broker development
- User NBAPI(North Bound API) Development



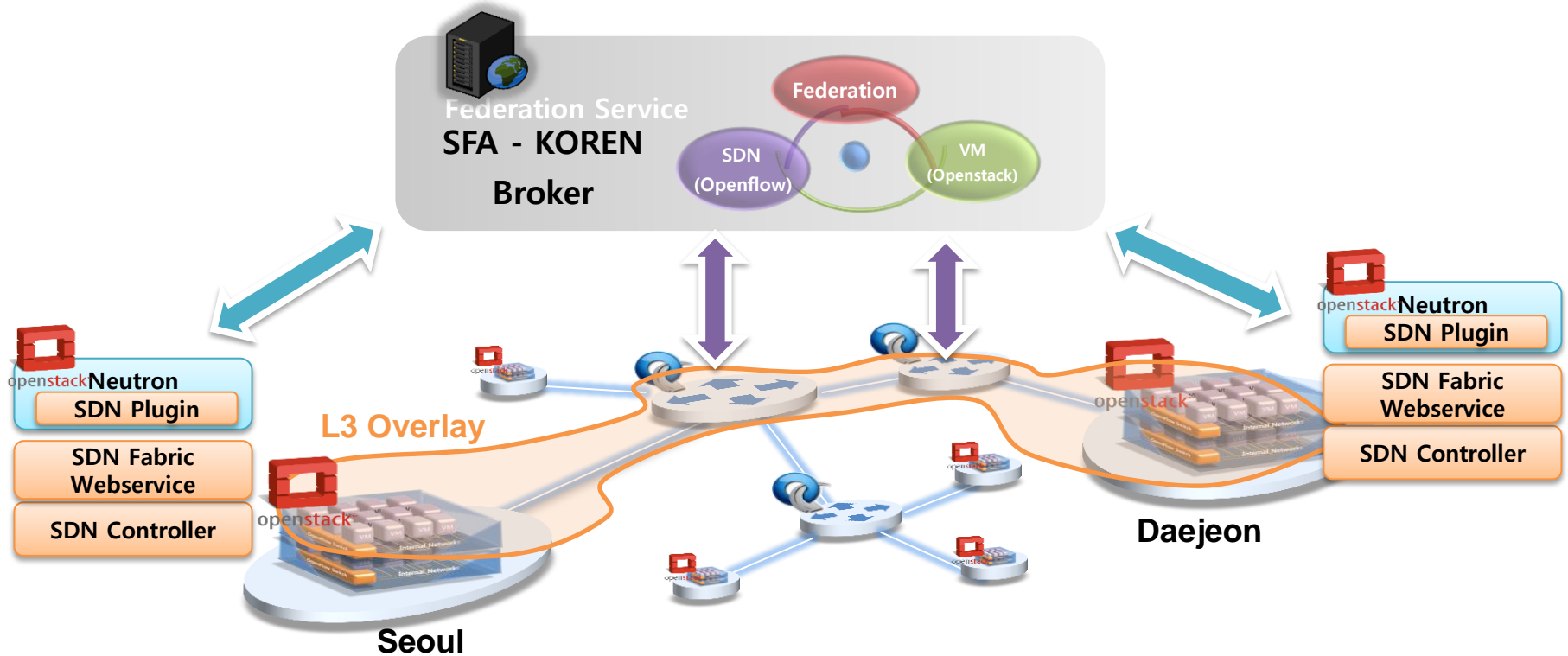


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SDN/Cloud based KOREN Virtual Infra Testbed

- Extended User API for SDN Controller and Cloud Infrastructure
 - We are using OpenStack as a cloud management system
- Multisite support for SDN controller
 - Need distributed SDN controller ?
- L3 Overlay management through software



Q & A