Problem statement of SDN and NFV co-deployment in cloud datacenters

draft-gu-sdnrg-problem-statement-of–sdn-nfv-in-dc-01

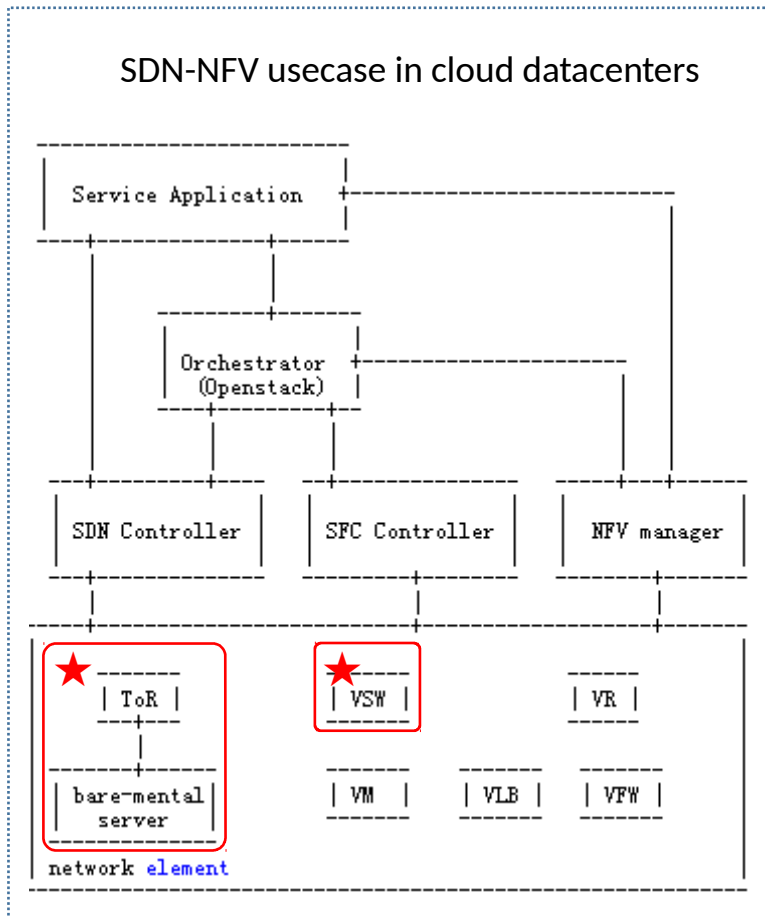**draft-gu-sdnrg-decoupling-scheme-hypervisor-SDN-00**

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Introduction

SDN-NFV usecase in cloud datacenters

```
 ---------------
| Service Application     |+----------------------------
 ---------------                                        |
         |         |                                    |
         |         |                                    |
      ---------------                                   |
     | Orchestrator    |-------------------             |
     | (Openstack)     |                  |             |
      ---------------                     |             |
         |       |                        |             |
 ---------------    ---------------    ---------------
| SDN Controller |  | SFC Controller |  | NFV manager |
 ---------------    ---------------    ---------------
         |                 |                 |
 ----------------------------------------------------------
 ★ -------        ★ -------         -------
  | ToR |          | VSW |          | VR |
   -------          -------          -------
     |
   -------          -------  -------  -------
  |bare-mental|    | VM |  | VLB |  | VFW |
  |  server  |      -------  -------  -------
   --------
network element
```

- Problems found out in SDN/NFV co-deployment in cloud datacenters have been presented in this draft due to practical practice.
- Changes from -00 to -01
  - ✓ **Virtualized platforms**: details talking about in the draft-gu-sdnrg-decoupling-scheme-hypervisor-SDN-00
  - ✓ **Network architecture:** some changes when bare-metal servers are introduced
  - ✓ **Interface standardization:** NBI & SBI, especially open-source devices (ODL/ONOS) are popular
  - ✓ **Virtualization high availability**
  - ✓ **Benchmark standardization**
  - ✓ **Extension of network:** openstack \controller \forwarding devices limitations
  - ✓ **DCI:** SDN datacenters and traditional datacenters
  - ✓ **Practical practice experience**
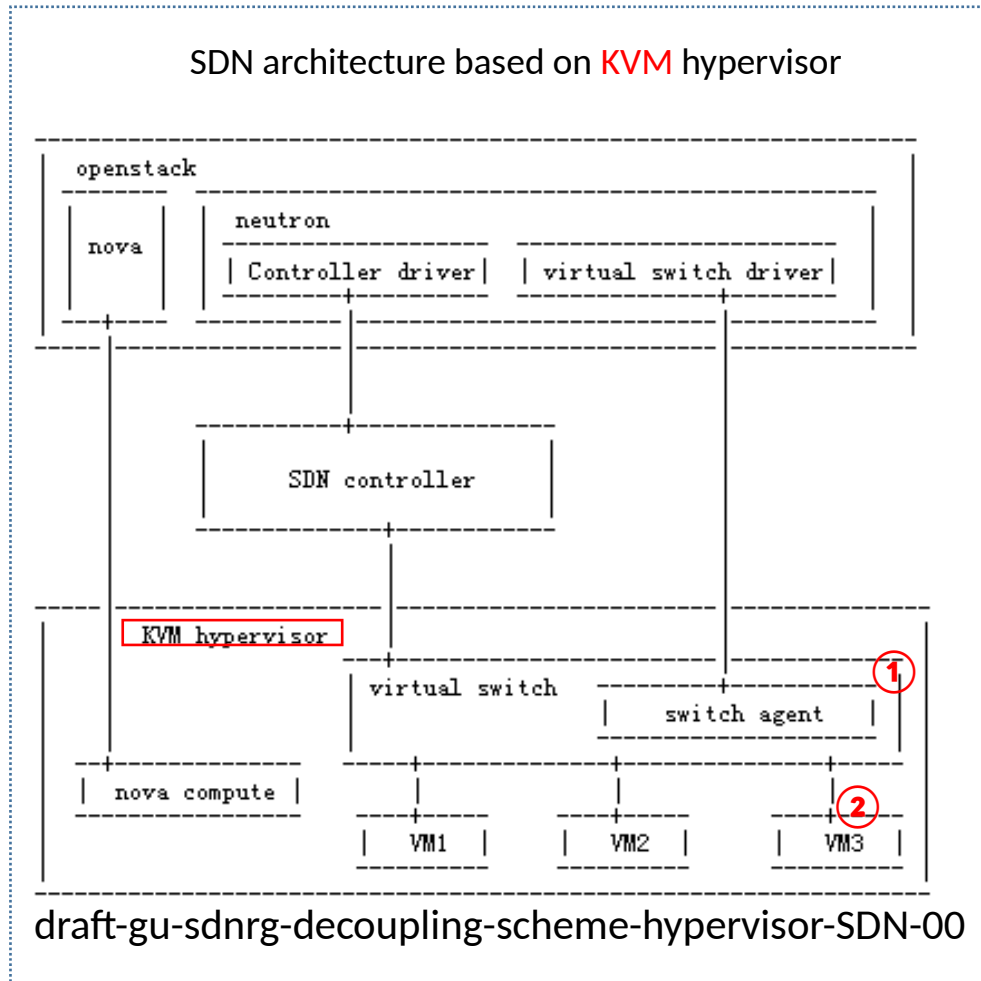
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Network architecture:
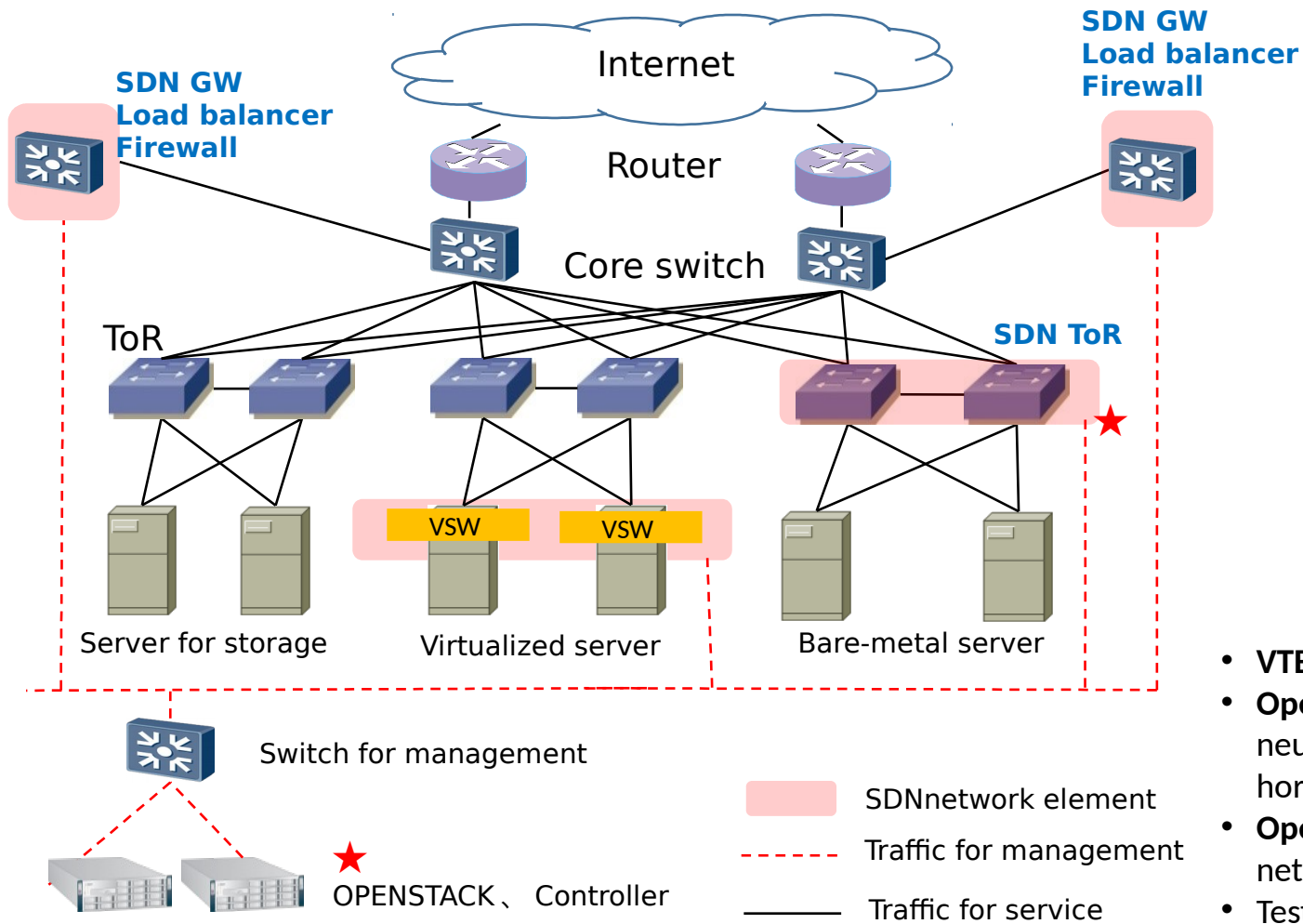
- **VTEP:** SDN ToR and vsw
- **Openstack:** ironic and neutron module with horizon undeveloped
- **Openstack version:** network limitations
- Test benchmark
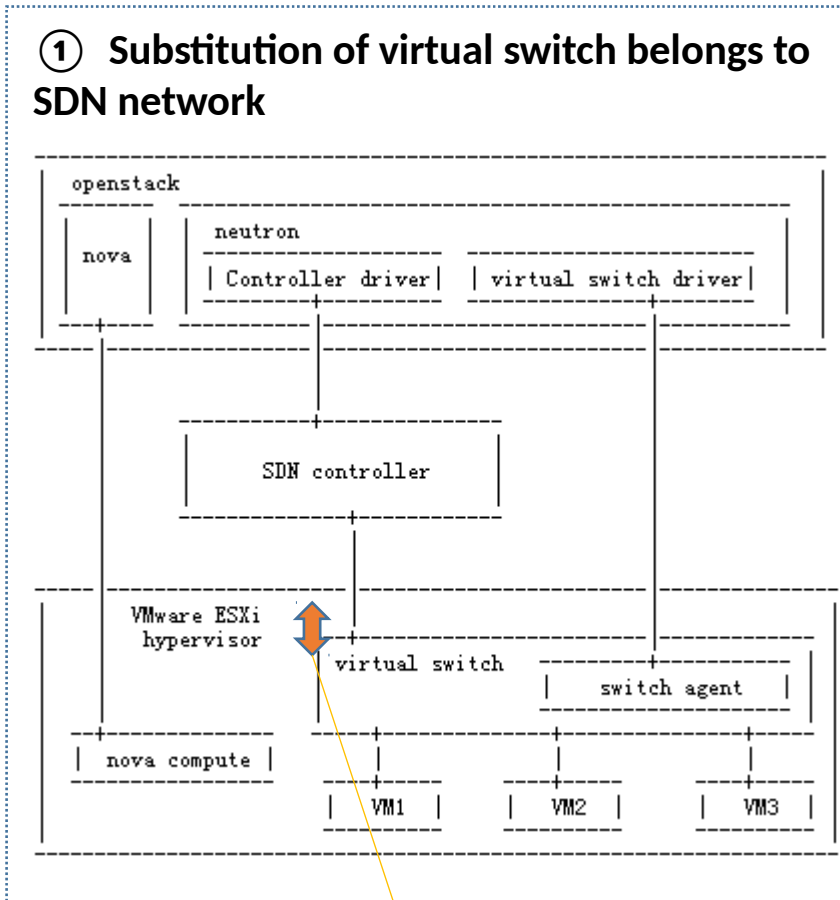
Virtualized platform:

SDN architecture based on KVM hypervisor

```
 openstack
 -------------------------------------------------
 |         | |   neutron                         |
 |  nova   | |---------------------------------- |
 |         | | | Controller driver| | virtual switch driver| |
 -----+----- |-----------+---------------------+--|
      |                   |                     |
      |                   |                     |
      |       ----------------------------      |
      |       |     SDN controller       |      |
      |       ------------------+---------      |
      |                         |               |
 -----|----------------------------------------------
 | KVM hypervisor |            |                  |
 |                ------------+----               ①
 |      | virtual switch ------------+-----------|  |
 |      |              |  | switch agent     |   |
 |      |              |  --------------------   |
 | --+----------- ----+----         ----+---- --+② |
 | | nova compute | |      |       |      | |      |
 | --------------- | VM1  |       | VM2  | | VM3  |
 |                 --------         --------  -------
 -------------------------------------------------
```

draft-gu-sdnrg-decoupling-scheme-hypervisor-SDN-00

- In private cloud, some commercial hypervisors other than KVM is used.

- **Problems:**

✓ Integrations of SDN controller with different hypervisors

✓ Relationship between open-vsw or SDN vsw and vsw bonding on the hypervisor

✓ Two solutions and their limitations:

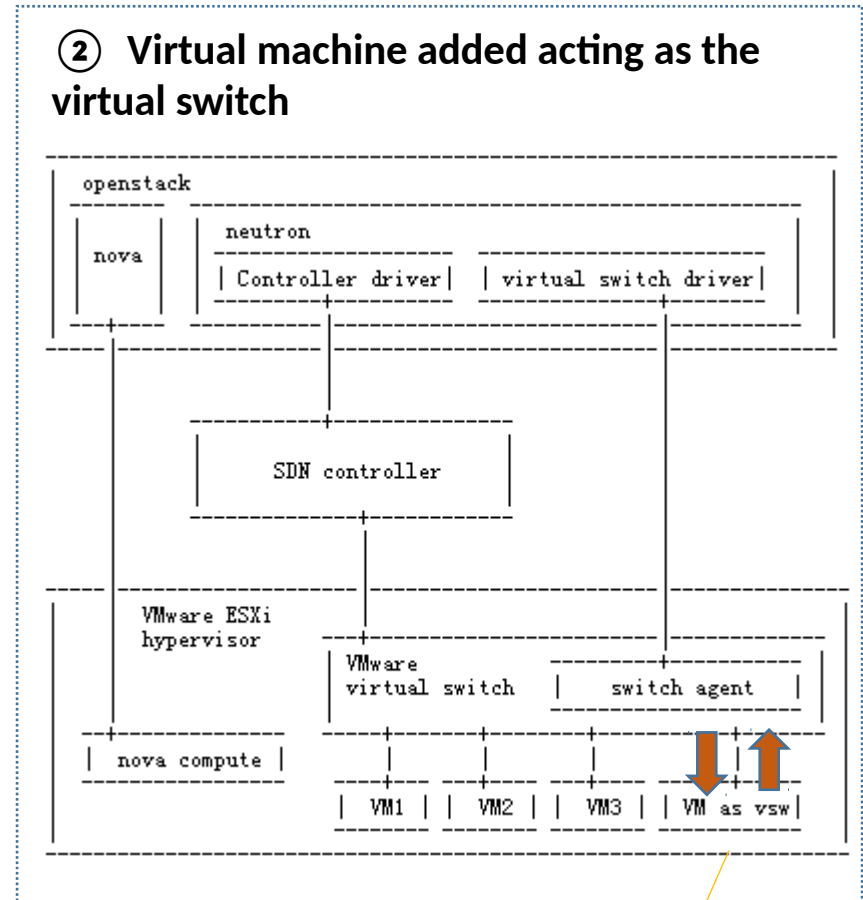① private interfaces of hypervisor

② the bottleneck of virtual machines

Virtualized platform:

① **Substitution of virtual switch belongs to SDN network**

```
------------------------------------------------------
openstack
  ---------   -----------------------------------------
 |         | |              neutron                    |
 |  nova   |  ------------------   ---------------------
 |         | | Controller driver| | virtual switch driver|
  --+------   --------+---------   ----------+----------
    |                 |                      |
    |        ---------+---------------       |
    |       |                        |       |
    |       |     SDN controller     |       |
    |       |                        |       |
    |        -----------+------------        |
    |                   |                    |
  --+-------------------+--------------------+---------
 VMware ESXi            |                    |
 hypervisor          --+------------   ------+--------
                     |virtual switch  |  switch agent  |
                      --------------   -----+---------
  -----------        --+----   --+----   ---+----
 | nova compute |    |      |  |      |  |       |
  -----------      --+----  --+----   --+----
                  | VM1 |  | VM2 |  | VM3 |
                   -----    -----    -----
```

Private interface of hypervisor
Cooperate with hypervisor

② **Virtual machine added acting as the virtual switch**

```
------------------------------------------------------
openstack
  ---------   -----------------------------------------
 |         | |              neutron                    |
 |  nova   |  ------------------   ---------------------
 |         | | Controller driver| | virtual switch driver|
  --+------   --------+---------   ----------+----------
    |                 |                      |
    |        ---------+---------------       |
    |       |                        |       |
    |       |     SDN controller     |       |
    |       |                        |       |
    |        -----------+------------        |
    |                   |                    |
  --+-------------------+--------------------+---------
 VMware ESXi            |                    |
 hypervisor         VMware          ------+--------
                    virtual switch  |  switch agent  |
                                     -----+---------
  -----------        --+----   --+----   --+----  --+----
 | nova compute |    |      |  |      |  |      | |       |
  -----------      --+----  --+----   --+----  --+------
                  | VM1 |  | VM2 |  | VM3 | | VM as vsw|
                   -----    -----    -----   ---------
```

All traffic goes through vm as vsw
which can be the bottleneck

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Extension of network and DCI

In the near future:

- Extension of network

  Number of servers and virtual machines supported by SDN network is related with **openstack, controller, and all forwarding devices**. In fact, it takes a long time in building flow table on controllers, such as 300 VMs co-built about 25minutes after the improvement. **How about 3000 vms, 30000 vms? How about bare-metal servers without testing environment?**

- Datacenter inter-connection

  SDN cloud datacenters belongs to different vendors inter-connection; Traditional cloud datacenters and SDN cloud datacenters inter-connection with SDN devices equipped.

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Questions

- Would you like to share your practice experience?

- Would you like to participate and contribute to this work?

- How can all the problems summarized in building this informational draft?

Next Step…

Solicit comments and suggestions…

MANY THANKS

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