IPv6 Considerations for Network Function Virtualization (NFV)

draft-chen-v6ops-nfv-ipv6-00

IETF 91, Nov 2014

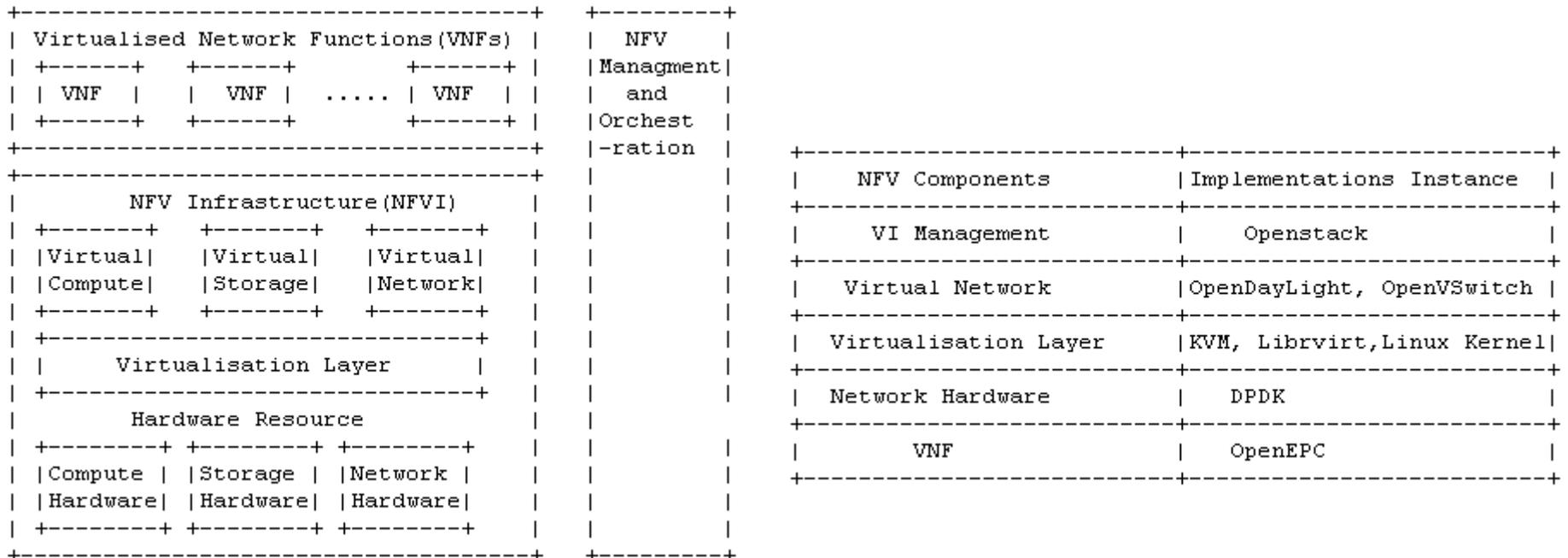G. Chen, H. Deng (Presenting)

China Mobile

Overviews

- NFV is using generic processor and virtualization to replace current dedicated hardware for telecom operators by the need to improve service agility and reduce operational cost. IPv6 is a fundamental feature should be enabled.
- This memo describes the layered NFV components and typical implementations. The IPv6 considerations have been elaborated to each component in order to   consolidate IPv6 demands across entire NFV system.

Scope

We try to document the effort made to enable IPv6 across all components as illustrated in the overall NFV architecture

```
+------------------------------------+   +---------+
| Virtualised Network Functions(VNFs) |   |   NFV   |
| +------+    +------+        +------+ |   |Managment|
| | VNF  |    | VNF  |  ..... | VNF  | |   |  and    |
| +------+    +------+        +------+ |   |Orchest  |
+------------------------------------+   |-ration  |
+------------------------------------+   |         |
|         NFV Infrastructure(NFVI)    |   |         |
| +-------+   +-------+   +-------+   |   |         |
| |Virtual|   |Virtual|   |Virtual|   |   |         |
| |Compute|   |Storage|   |Network|   |   |         |
| +-------+   +-------+   +-------+   |   |         |
| +------------------------------+   |   |         |
| |      Virtualisation Layer     |   |   |         |
| +------------------------------+   |   |         |
|        Hardware Resource        |   |   |         |
| +--------+ +--------+ +--------+  |   |         |
| |Compute | |Storage | |Network |  |   |         |
| |Hardware| |Hardware| |Hardware|  |   |         |
| +--------+ +--------+ +--------+  |   |         |
+------------------------------------+   +---------+
```

```
+---------------------------+---------------------------+
|      NFV Components        |Implementations Instance   |
+---------------------------+---------------------------+
|     VI Management          |        Openstack          |
+---------------------------+---------------------------+
|    Virtual Network         |OpenDayLight, OpenVSwitch  |
+---------------------------+---------------------------+
|   Virtualisation Layer     |KVM, Librvirt,Linux Kernel |
+---------------------------+---------------------------+
|   Network Hardware         |        DPDK               |
+---------------------------+---------------------------+
|       VNF                  |        OpenEPC            |
+---------------------------+---------------------------+
```
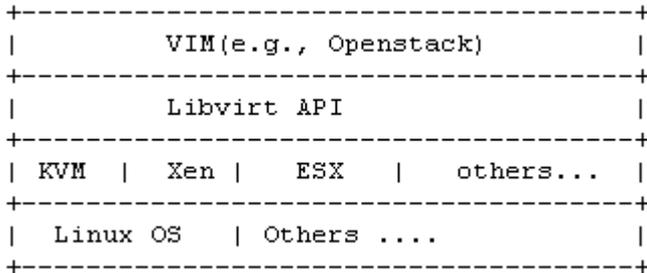
IPv6 Considerations on VIM

- Given the large address space that IPv6 offers, the floating IPv6 may be unnecessary. End-to-end native IPv6 is more desirable than any of the transition solutions. Dual stack is the current main consideration

IPv6 Considerations on Virtual Network

- IPv6-enable OpenDaylight, OVS

IPv6 considerations on Virtualization Layer

```
+----------------------------------------+
|         VIM(e.g., Openstack)           |
+----------------------------------------+
|            Libvirt API                 |
+----------------------------------------+
| KVM  |  Xen |   ESX   |   others...    |
+----------------------------------------+
|  Linux OS  | Others ....               |
+----------------------------------------+
```

- IPv6-enable Libvirt

- IPv6-enable KVM

- IPv6-enable Linux

IPv6 Hardware Interface

IPv6 supported DPDK: IPv6 fragmentation reassembly. For the fast path, it would support IPv6 exact match flow classification.

Comments from Hu Bin @AT&T

- Figure 2:
  - Virtualization Layer: Not sure what Linux Kernel means. Do you mean LXC (Linux Container) etc. OS-level virtualization compared to KVM etc. hypervisor?
  - Network Hardware (NIC): In addition to DPDK, there is an open source effort ODP (Open Data Plan)
- Chapter 3:
  - First sentence: I don't quite understand it. VIM manages NFVI resources, but it doesn't manage VNF. NFVO and VNFM manage VNFs.
  - In addition to those IPv6 requirement, would you consider additional features that are not supported in Neutron, such as:
    - External connectivity needs external router / border gateway, and external IPv6 L2 VLAN cannot directly be attached to VM
    - IPv6 subnet routing via L3 agent to external IPv6 network is not supported.
    - Additional IPv6 extensions such as IPSec, IPv6 Anycast, Multicast etc.
    - Access to metadata server (and GRE/VXLAN) still requires IPv4
    - Floating IPv6, IPv6 prefix delegation and IPv6 ICMP security group are in roadmap, pretty much for Kilo or beyond

Comments from Hu Bin @AT&T

- Chapter 4: (Virtual Network)
  - Better to list the requirements in a more organized way, such as bullet points

- Chapter 5: (Virtualization Layer)
  - Libvirt:
    - I think libvirt manages hypervisors. It doesn't manage VNFs. I could be wrong, but I haven't seen a reference of using libvirt as VNFM. Can you point me to some references?
    - Can we have a requirement to have libvirt support dynamic routing protocols?

- Chapter 6: (Network Hardware Acceleration)
  - Do you want to specify requirement for ODP as well?

- OpenEPC:
  - Can you elaborate more details of IPv6 requirement on those EPC components?

Ref: Openstack Kilo plan for IPv6

- 1.IPv6 prefix delegation support in Neutron
- 2.Support Multiple IPv6 Prefixes and Addresses for an IPv6 Network
- 3.Support for dual-stack (IPv4 and IPv6) on external gateway
- 4.Support IPv6 DHCPv6 Relay Agent
- 5.IPv6 Floating IP support
- 6. ….

Next Step

- Is it some thing useful v6ops should work?

- Adopted as a WG Item?