Innovative NFV Service-Slicing Solution Powered by DPDK

Hayato Momma
Advanced Technologist (Software) / Principal Engineer (Senior Manager Class)
1st Software Development Division
NEC Communication Systems, Ltd.
Orchestrating a brighter world

NEC brings together and integrates technology and expertise to create the ICT-enabled society of tomorrow.

We collaborate closely with partners and customers around the world, orchestrating each project to ensure all its parts are fine-tuned to local needs.

Every day, our innovative solutions for society contribute to greater safety, security, efficiency and equality, and enable people to live brighter lives.
Who am I?

Hayato Momma  <momma.hy@ncos.nec.co.jp>
- Principal Engineer (Senior Manager Class)
  at NEC Communication Systems, Ltd.

Works for
- Many Carrier Grade Linux Systems: kernel and any other software engineer
  - Carrier SIP Nodes, 3G/4G Mobile Core Nodes (xGSN, EPC), vCPE/vBRAS, and so on
- DPDK-OVS (OVDK) as CGHV-VS (Carrier Grade Hyper-Visor – Virtual Switch)

Little ... contributor (as old address <h-momma@ce.jp.nec.com>)
- DPDK: Reviewed (memnic)
- DPDK-OVS: Reviewed, Signed-Off
- Linux Networking: Reviewed (ixgbe)
DPDK in NFV

~ 1st NFV Era with DPDK~

NFV: Network Functions Virtualisation
http://www.etsi.org/technologies-clusters/technologies/nfv
DPDK in NFV opened a new era

NEC opens a new era of networking with DPDK!

World’s 1st commercial VNFs

NEC launched the **World’s 1st** commercial vEPC (Oct. 2013), vMVNO-GW (Feb. 2014) and pre-commercial vCPE (Jun. 2016)

NEC Launches World’s First Virtualization Mobile Core Network Solution
Bolstering NEC SDN Solutions’ Lineup for the Telecom Carrier Market

NFV requests ‘Software Server’

Virtualized Packet-forwarding functions powered by DPDK

- EPC: Evolved Packet Core
- LTE: Long Term Evolution
- PDN: Packet Domain Network
- ISP: Internet Service Provider
- MME: Mobility Management Entity
- S-GW: Serving Gateway
- P-GW: PDN Gateway
- HSS: Home Subscriber Server
- PCRF: Policy and Charging Enforcement Function

Hard days – NFV not yet understand

People in telecom carrier operators and even vendors were negative against to virtualization, especially data plane nodes.

ATCA: Advanced Telecom Computing Architecture

https://www.picmg.org/openstandards/advancedtca/
Hard days – Finding missing packets

Performance target:
Lossless 2Mpps at 512B (User) per 10G port (close to wire rate)

- Mostly went well, but sometimes massive loss occurred

Why packets lost?

- Try and Error
  - Set processor affinity – done by DPDK
  - Power Management – set to disabled – still occurred

- Guess why?
  - 2Mpps -> if PMD stopped 10msec, RX 20K packets will be not handled -> Massive loss!
  - Probably due to VM_exit

- Got ftrace log on the host. (cont’d)
Hard days – Finding missing packets

Root cause was, Someone typed ‘ls’ on the host!

• We were aware ‘pinning on the GUEST’,
  But we forgot ‘pinning on the HOST’
  • set processor affinity on the host for all of hypervisor threads
  • set isolcpus parameter on the host loader to isolate hyper-visor threads from others

And so on, we achieved goal with good performance for user data nodes by NFV!

The Moment NEC got confident NFV is really possible!

Finally, we could launched NFV product at 1st in the World
Service Slicing Gateway

~ Ready for 5G/IoT Era with DPDK ~
TODAY: IoT era is coming

IoT/M2M presents a different set of requirements for existing Mobile-Core-Network

- Smart Meter / Home Electronics
- Logistics
- Security
- POS / Vending Machine
- Transportation
- Government / Public Service
Service Slicing

Separates IoT/M2M traffic from the other traffic

Can be isolated from IoT traffic "Noise"

Can optimize to IoT traffic profile

EPC for General purpose

EPC for IoT purpose

EPC

PCRF

EPC

PCRF

General Service

IoT Service

Slice-GW
'Service-Slicing-Gateway' realizes the IoT-service-slicing. Can Flexible Service Slicing. Service Slicing Gateway. Re-route and forward based on Control Plane data. with DPDK!
Why DPDK?
Why DPDK?

Need Massive Traffic Capacity
- Mobile Core Nodes can **scale OUT**
- But Load balancer or Slicer is needed to **scale UP**

NFV requests built with "Software" servers
- Forwarding Function: Fastpath with DPDK
- DPI Function: Software DPI Engine
We chose DPDK

- NEC foresaw that virtualization is necessity.

- We chose DPDK.

- We’ve contributed to DPDK.

- We are grateful to all the relevant, and we hope DPDK community continues growing up.
Thank you very much

If you have any questions, please contact:

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