Orchestrating a brighter world NEC

DPDK Summit USA 2016

Innovative NFV Service-Slicing Solution Powered by DPDK

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1st Software Development Division

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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

http://www.nec.com/en/global/solutions/tcs/nfv/

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

http://www.nec.com/en/press/

*** For immediate use October 22, 2013

Tokyo, October 22, 2013 - NEC Corporation
virtualized Evolved Packet Core (vEPC), a vir
(NFV), network functions on a virtualization in
(IA).

The solution will first be offered as one of NE
market unveiled in July this year. Evolved Pac
networks, is composed of functions such as M

NEC vEPC succeeded in virtualizing all of the
As a result, this solution provides for telecom
and management, and rapid launch of new se
infrastructure makes it possible to dynamicall
Furthermore, the use of IA servers significantl
dedicated hardware for mobile core network p

NEC launches world's first virtualized MVNO solution

Tokyo, February 18, 2014 - NEC Corporation (NE
Operator solution (vMVNO-SL) that achieves Netw

NEC's vMVNO-SL can be installed with an MVNO i
and a carrier's mobile network. This enables enhan
communication band and usage amount.

These functions are achieved using software that r
the cost of equipment as well as operation cost. Mo
compared to the construction of conventional dedic

This solution will be offered as one of NEC SDN So
domains of NEC's "Solutions for Society," which inc
on virtualized Customer Premises Equipment (vCP

"MVNO operators are often required to introduce g
data link," said Tsutomu Ookurano, senior manage

NEC Advances World's First Virtual Customer Premises Equipment Trial In Brazil

- NEC goes forward in the first virtual Customer Premises Equipment trial with Telefonica in Brazil. This is the first time that an NFV project takes place with real customers in the residential market -

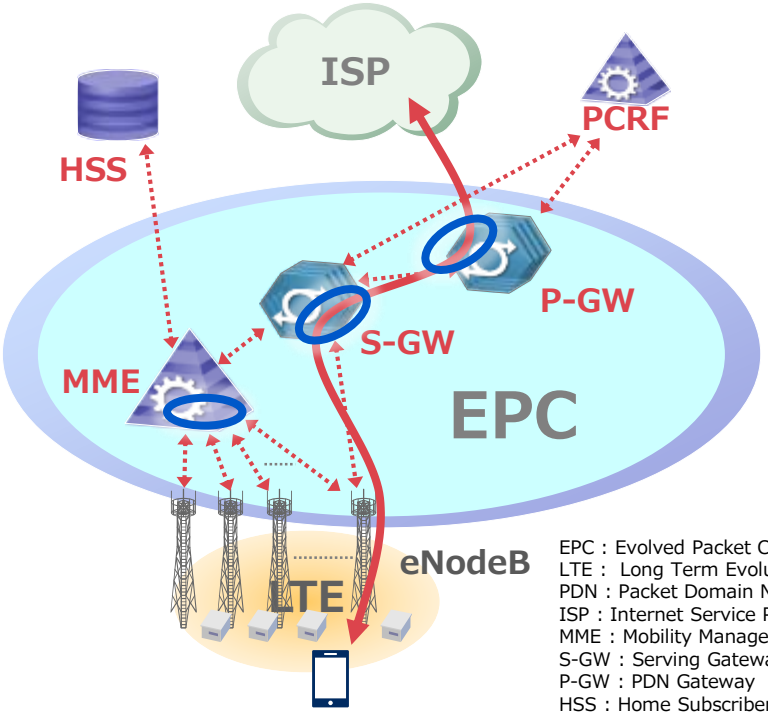
Like 85 Tweet G+1 0

Tokyo, Japan – June 22, 2016 – NEC Corporation (TSE: NEC 6701) announced today the completion of the first phase of a pre-commercial trial for virtual Customer Premises Equipment (vCPE) for residential users in the network of Telefonica's Brazilian affiliate VIVO.

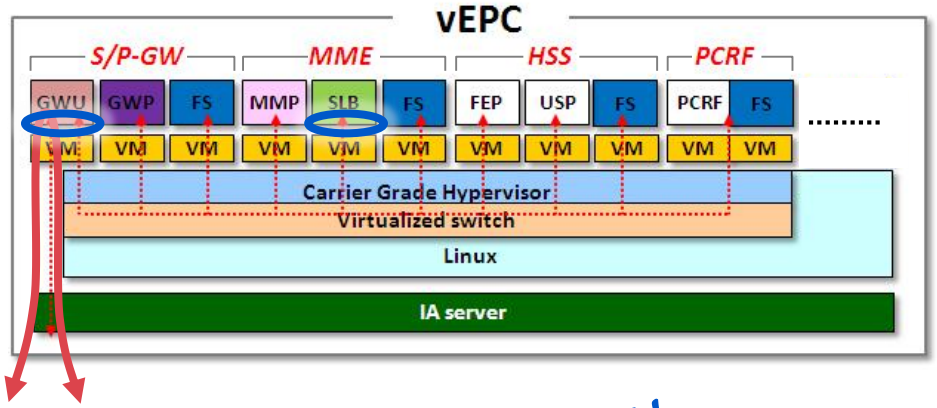
This trial was conducted with existing customers and deployed in the carrier's own commercial network.

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



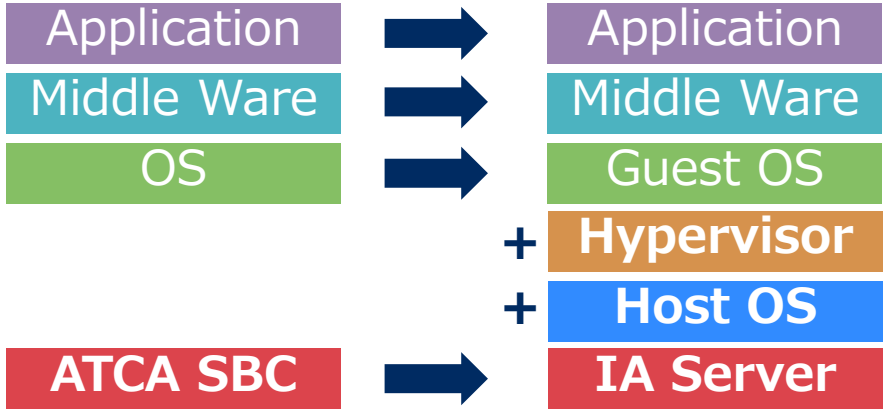
with DPDK!

Control-Plane (Signaling)
User-Plane (User Data)

http://www.nec.com/en/global/solutions/tcs/vepc/

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

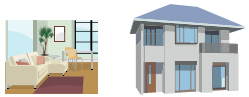
Service Slicing Gateway

~ 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



Security

Transportation

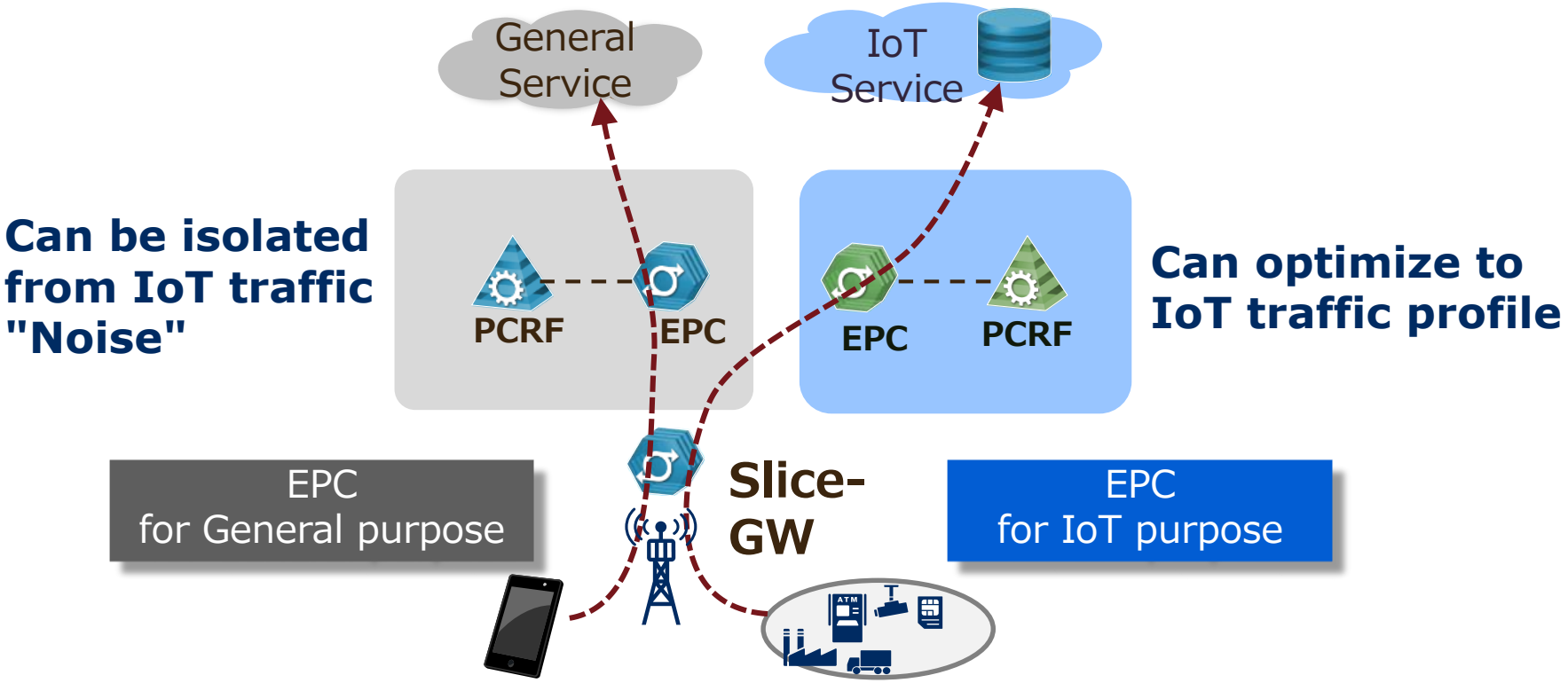
Logistics

POS / Vending Machine

Government / Public Service

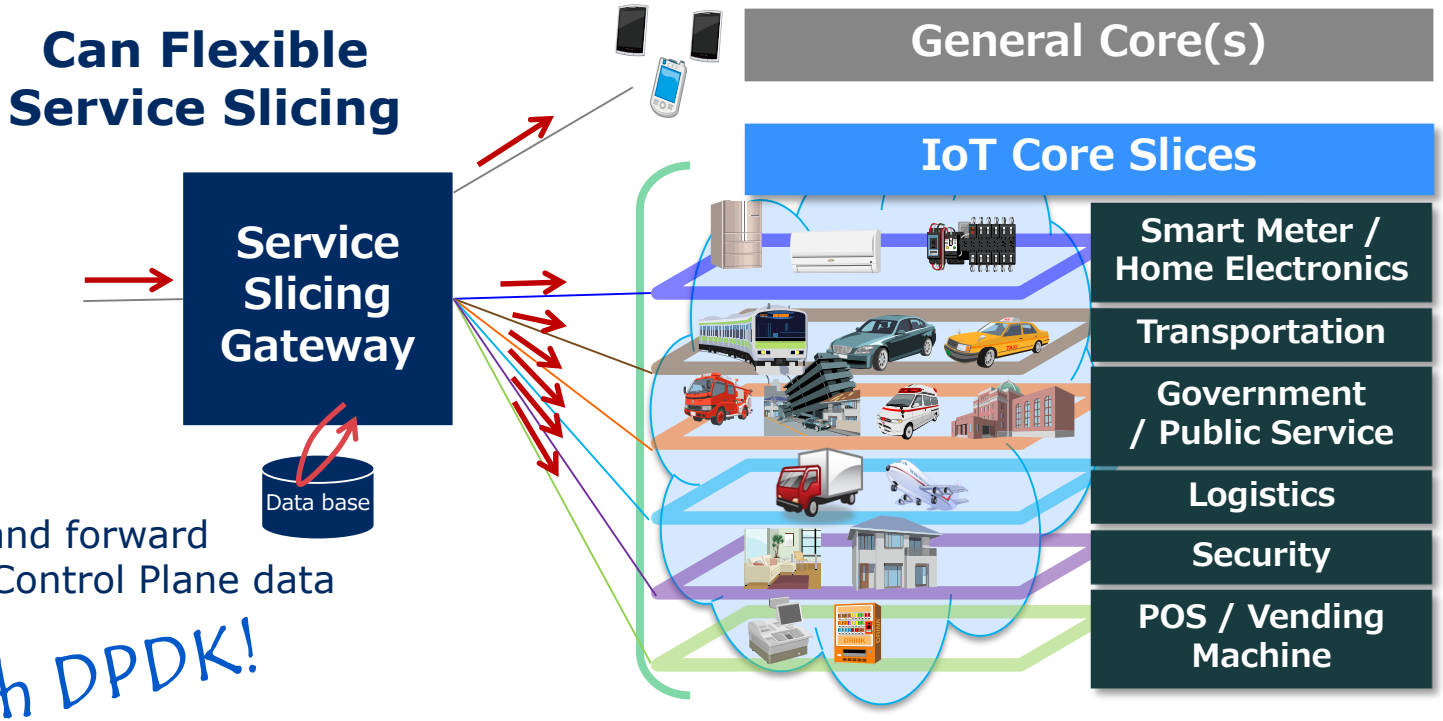
Service Slicing

Separates IoT/M2M traffic from the other traffic



Service Slicing Gateway

'Service-Slicing-Gateway' realizes the IoT-service-slicing



Re-route and forward
based on Control Plane data

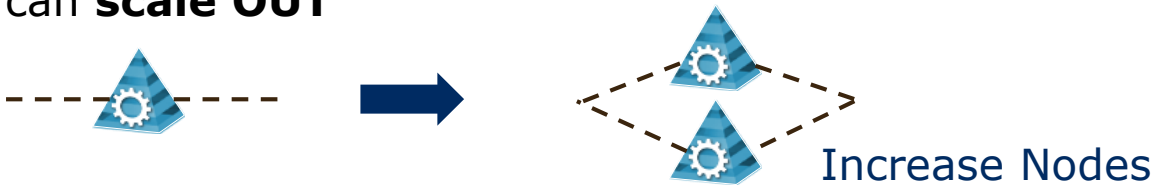
with DPDK!

Why DPDK ?

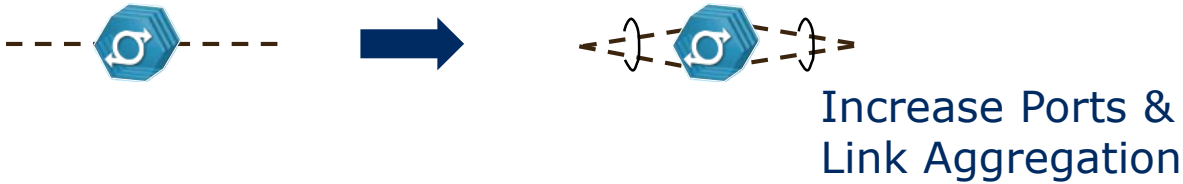
Why DPDK ?

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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