Hardware Acceleration Solution and requirements for CNTT

China Mobile
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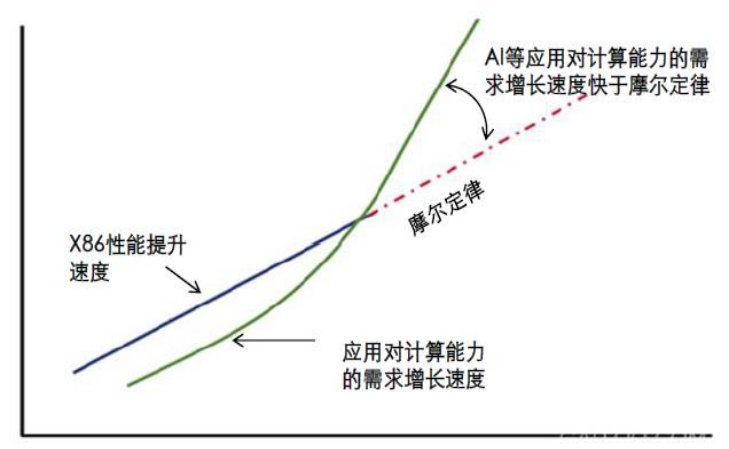
Agenda

1. Hardware Acceleration Solution
   - UPF hardware acceleration Solution
   - OVS offload Solution
   - MEC GPU acceleration Solution
2. Requirments for CNTT

Hardware Acceleration Solution

The existing data for forwarding mode cannot meet the damand gradually, so hardware acceleration is need.

- ✓ Large connection
- ✓ Low latenacy
- ✓ High bandwidth



✓ Acceleration NIC

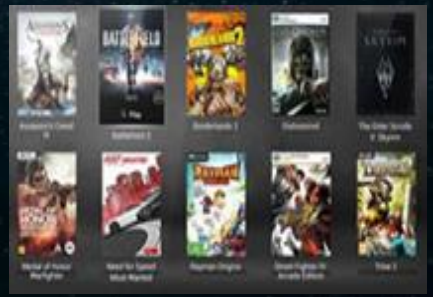
OVS	GTP
HQoS	AR/VR
IPSec	Video rendering
Audio and video codec	Picture processing

Hardware Acceleration Solution

Hardware acceleration requirements in NFV scenario:

- For eMBB, uRLLC and edge computing scenarios of 5G telecom, the demand for network acceleration and new edge computing services such as AI are more prominent

5G



Focus on:

- vSwitch acceleration
- VNF business acceleration
- GPU acceleration

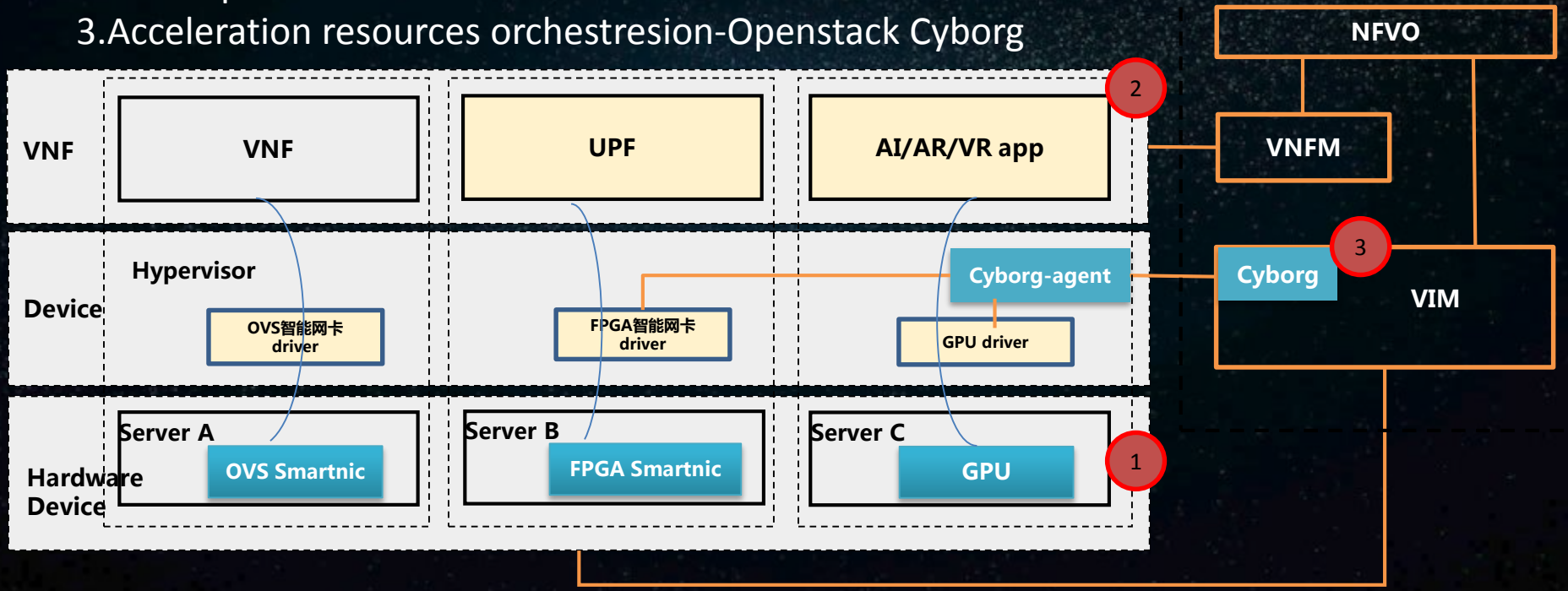
Hardware Acceleration Solution

Three issues should be taken attention:

1.Hardware selection

2.Development work

3.Acceleration resources orchestresion-Openstack Cyborg



Hardware Acceleration Solution

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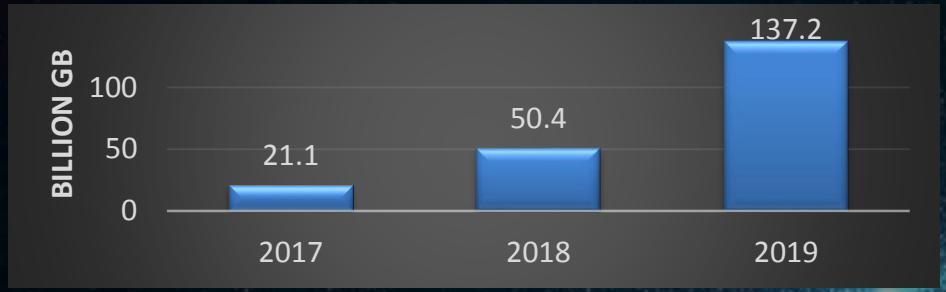
2. Requirements for CNTT

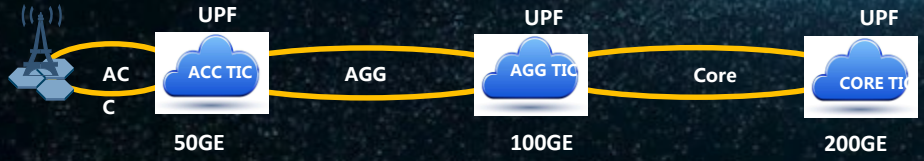
Hardware Acceleration Solution

GW-U/UPF acceleration requirements analysis – focus on data plane



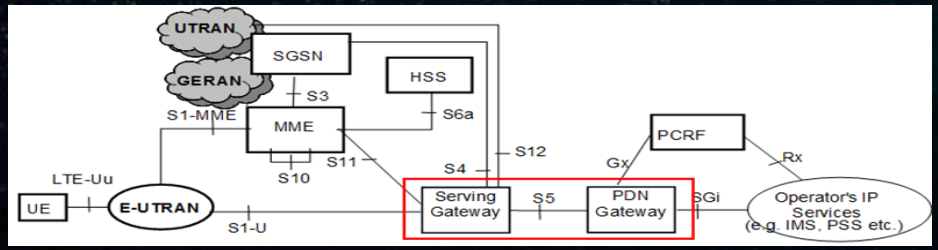
!!!CPU can't meet the data forwarding requirements, or stack CPU

!!!5G high bandwidth nic increase consumption of a server's computing resources.



GW-U/UPF

- Computational、data forwarding network element
- GTP protocal process funtion



GW-U/UPF

- Pooling deployment can prevent vendor lock-in and reduce the difficulty of procurement and construction

Hardware Acceleration Solution

China Mobile’s UPF hardware acceleration solution:

scenario	UPF deployment Solution
Core (province, city)	Hardware and software decouple solution: Nic vendor A provides acceleration nic, and VNF vendor B provides acceleration software that can offload to the A’ s nic.
Edge(villiage, compute room with poor condition)	All in one solution.Hardware and software are provided by the same vendor. (ChinaMobile recommend FPGA)

Hardware Acceleration Solution

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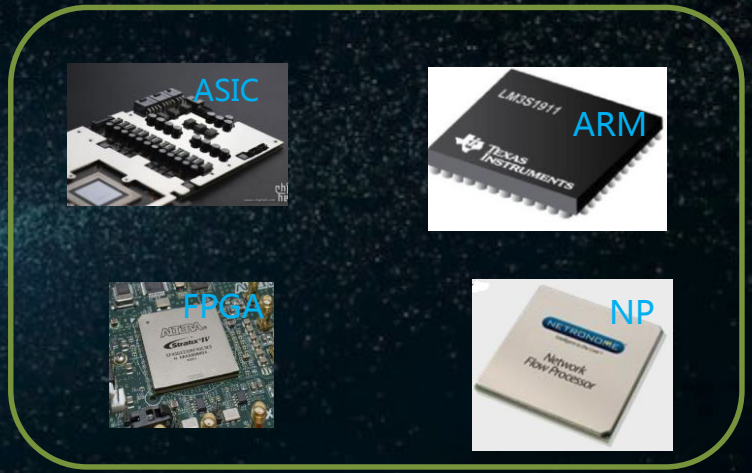
Hardware Acceleration Solution

Current industry actively vSwitch hardware acceleration technology research,which is relatively mature.



Hardware types: FPGA、SOC、NP、ASIC
FPGA: ecologically open, programmable
SOC: coustomized, terminal equipment
NP: Mainstream manufacturers have no roadmap
ASIC: Long production cycle, suitable for large-scale use of mature algorithms and applications

Hardware Acceleration Solution

China Mobile's vSwitch hardware acceleration solution:

scenario	vSwitch deployment Solution
Edge, high bandwidth and high forwarding	Server's vendor provide acceleration nic and vSwitch function, vSwitch is decoupled with hypervisor, this function is provided with acceleration nic , and hypervisor's vendor need to integrate vSwitch function. This decouple method doesn't need define protocol level interfaces, and easily realized.

Hardware Acceleration Solution

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Hardware Acceleration Solution

1. Current mainstream deep learning frameworks support Nvidia GPU，such as TensorFlow、Caffe、MXNEt、CNTK、Torch…
2. Nvidia gpus are adopted by domestic and foreign Internet companies, such as Google, Microsoft, Facebook, alibaba, tencent, baidu, iflytek, etc
3. Products for deep learning scenarios include V100, P100, P40, P4, T4, etc

GPU application scenarios in the telecommunications industry include AI、Big Data analysis 、multimedia vendering

Hardware Acceleration Solution

China Mobile's GPU hardware acceleration solution:

scenario	Usage mode	
High concurrency computing, deep learning, big data, graphical workstations	Passthrough GPU	GPU is directly transmitted to a single virtual machine for use High cost/Low resource utilization/ High performance
	Virtual GPU	GPU is virtualized into multiple vgpus, which are transmitted to the virtual machine for use. High cost/High resource utilization/ High performance

Gap Analysis with CNTT

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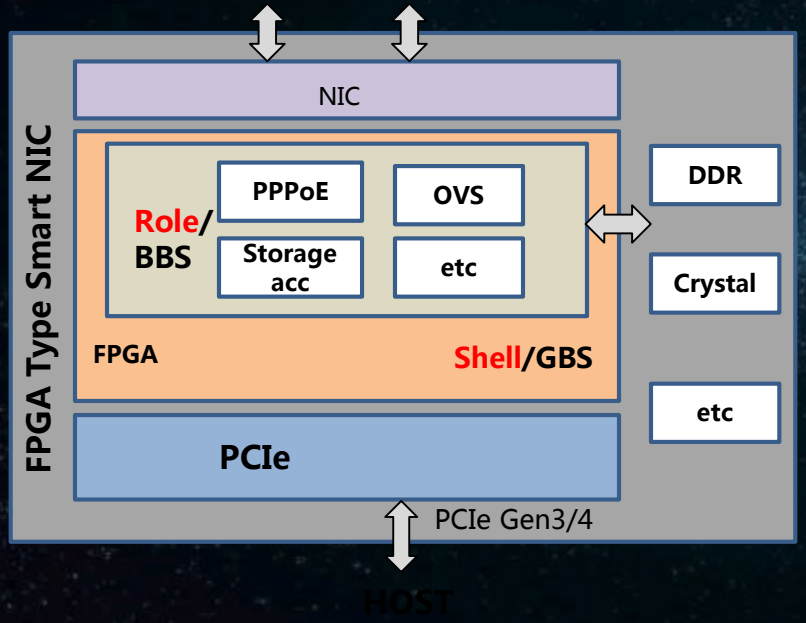
Requirements for CNTT

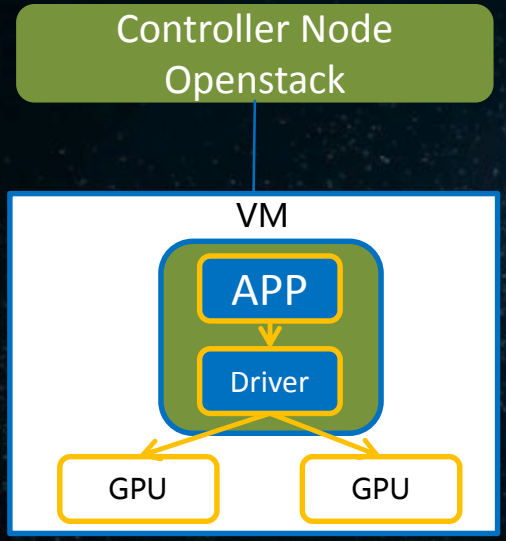
Hardware acceleration requirments for CNTT



- UPF
  - FPGA support shell-role structure
  - FPGA support multiple roles
  - NFVI support virtualization

Requirements for CNTT

Hardware acceleration requirements for CNTT

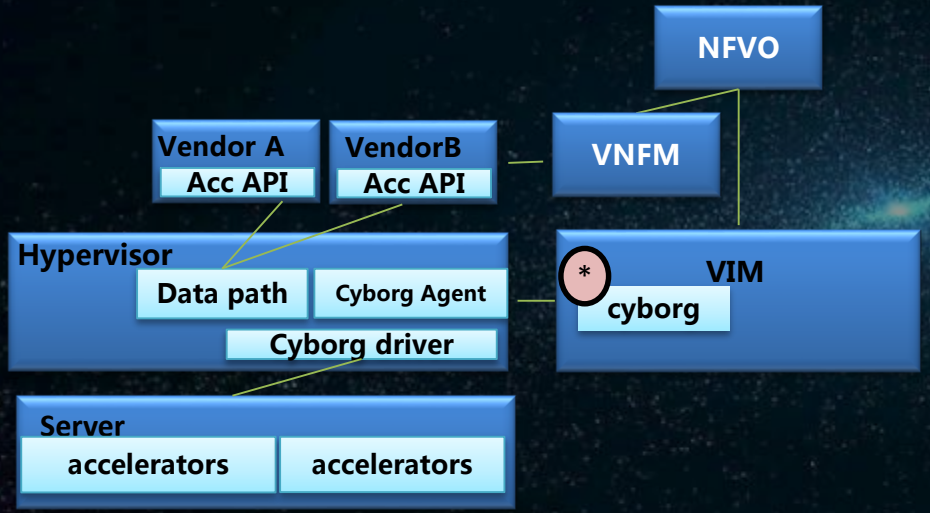


- GPU

  The NFVI need to support pass through the GPU function to the VM, support vGPU.

Requirements for CNTT

Hardware acceleration requirements for CNTT



- Management–for NFVI
  - Cyborg for all types of accelerators
  - Cyborg need to recognize a role to offload an acceleration bin package.

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THANKS!

Q&A

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