Smart NIC features (Draft)

Priority： A>B>C

Basic features:

A：

1. Needs to provide mechanism to recover from the system crashes remotely. (i.e. Having extra channel to login to the card, or can be reset remotely, bypass the cores/FPGA in the NIC if the key process died in the card, etc.)

2. Support PXE protocol.

3. >8 G memory (for offloading network & storage)

4. CCIX/CXL support

5. Secure boot/Secure Key Storage

6. Software programmability

B:

1. BMC support

2. SHA-256-bit hardware acceleration

Network virtualization

A:

1. SRIOV
    1. Representer Interface to Host VF
    2. Security. Host software cannot set both PF/VF features by default (including queue length, the number of queues, etc.)
    3. Large MTU for VF. (which allows a VF can transmit a long packets (> 1500) to the NIC cores, this saves the PCIe bandwidth for TX traffic)
    4. Virtio hardware backend (or a failover interface which binds a VF and a vritio interface. Mainly for live migration)

2. Common Offload Capabilities
    1. Checksum offload (IP/TCP/UDP)
    2. TSO
    3. UFO(?)
    4. Tunnel TSO (VXLAN at least)

B:

3. Capable to run DPDK based application
    1. Support Linux
    2. Both PF and Representer Interfaces can be opened by 2 DPDK process simultaneously. (mainly for non disruptive upgrade)
    3. Use DPDK rte_flow interface to perform hardware offloading if hw supports offloading
4. Hardware Offloading (?)
    1. Match
        1. L2: Ethertype、VLAN
        2. L3: IPv4、IPv6 （Mask support for IP）
        3. L4: TCP/UDP/ICMP
        4. VXLAN outer/inner header match
    2. Action
        1. Header Rewrite
            1. MAC/IP Rewrite
        2. VLAN PUSH/POP (Map VXLAN ID to VLAN VID)
        3. VXLAN PUSH/POP
        4. DROP
        5. Metering
        6. Mirror (for flow tracing, network fault diagnose)
        7. Counter

8. Hair-pin Flow (a packet coming from an interface and be processed by the hw and output to the same interface)

5. RDMA Virtualization

Network Protocol Stack Acceleration

B:

4. RDAM

1. IPSec (?)

C:

2. HTTPS offloading (?)

3. Compress/Decompress

Storage Acceleration

A:

1. NVMeoF interface