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