

Smart NIC features (Draft)

Basic features:

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. BMC support
4. >8 G memory (for offloading network & storage)
5. CCIX/CXL support
6. Secure boot/Secure Key Storage
7. Software programmability
8. SHA-256-bit hardware acceleration

Network virtualization

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 virtio 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)
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

1. IPSec (?)
2. HTTPS offloading (?)
3. Compress/Decompress
4. RDAM

Storage Acceleration

1. NVMeoF interface

Video Processing Acceleration

1. Video Processing Accelerator (H264/265 encoding/decoding)