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| NX E310 E312网卡用户手册 |

# （新中文）封面

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## 概述

### 产品简介

5G、人工智能、大数据等业务快速发展，对数据中心网络带宽、时延、转发速率提出更高的要求。中兴通讯结合业务需求，推出支持OVS 卸载的ZXiNIC智能网卡，提供低时延，高转发，高性价比的硬件加速解决方案。

ZXiNIC 智能网卡将vSwtich转发面卸载到智能网卡硬件上，通过可编程硬件加速引擎，实现丰富的网络功能，全面提升网络能力，提供25G/50G Gbps网络吞吐量，200万流表，时延<30us。卸载后主机释放出来的CPU资源可用于部署业务应用，提升服务器资源利用率。

ZXiNIC智能网卡支持标准rte\_flow 接口，兼容中兴通讯自研软件交换机DVS 以及第三方标准OVS。在SDN场景下，配合OVS 通过openflow 协议与SDN控制器对接，提供SDN VTEP功能。

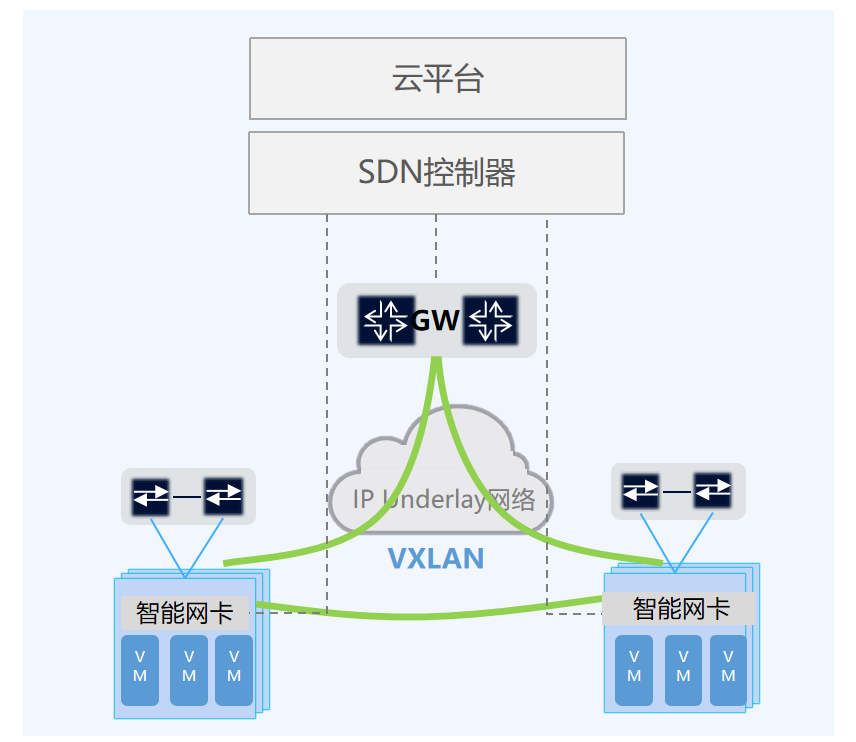
ZXiNIC智能网卡为标准PCIe网卡，适用于标准服务器；兼容标准OpenStack和Kubernetes软件架构，适配标准云平台，提端到端硬件加速解决方案。

ZXNIC智能网卡可广泛应用于公有云、私有云、边缘云等各场景，提供极致算力，提升运维效率，降低TCO，是构建超大算力、弹性灵活数据中心的关键器件。

### 应用场景

ZXiNIC智能网卡实现网络卸载和加速，通过硬件加速引擎把网络I/O及虚拟交换机（OVS）等网络功能卸载，通过专用硬件来加速网络数据的转发。在SDN场景下，与配合OVS 与SDN控制器对接，提供SDN VTEP功能。

ZXiNIC智能网卡适用于网络带宽需求大、转发流表表项大、稳定性要求高的公有云、私有云、边缘云等各场景。



### 功能特性

**高性能，低时延**

* 基于可编程硬件FPGA实现OVS转发面的卸载及加速，提供更高的IO处理能力，时延更低。
* 支持百万级流表，支持50G吞吐量。

**可编程**

* 通过逻辑编程，实现丰富的转发特性，包括DVR（Distributed virtual route）、安全组、流镜像、Qos、VxLAN、业务链等。

**开放性**

* 支持标准virtio协议，对host呈现标准virtio-net pci设备，完全兼容标准virtio-net驱动，适配各种虚拟化场景。

**高可靠**

* vlan组网、vxlan组网下的都支持多个物理口组合成bond模式，实现网口的高可靠性。
* 基于vdpa驱动，支持virtio-net端口的热迁移，支持VM热迁移，业务迁移切换无感知。

**易用性强**

* 支持在线升级，提供方便的软件版本管理功能。
* 支持带外管理，通过BMC(Baseboard Management Controller)获取智能网卡的型号、MAC地址及连接状态等信息。

**低成本**

* 实现OVS 转发面CPU卸载，转发面占用2核CPU。提升转发性能的同时大幅降低CPU消耗。

## 硬件安装

### 2.1 E310/E312网卡技术规格

|  |  |
| --- | --- |
| 指标 | 说明 |
| 形态 | 全高半长PCIe标卡（167.65 mm × 111.15 mm） |
| 网络接口 | 4 × SFP28（4 × 25GbE） |
| PCIe接口 | PCIe 3.0 X16 |
| 功耗 | 40w |

表2.1-1

NX E310网卡以如图2.1-2为例，E310网卡的网口名称按如下顺序定义：

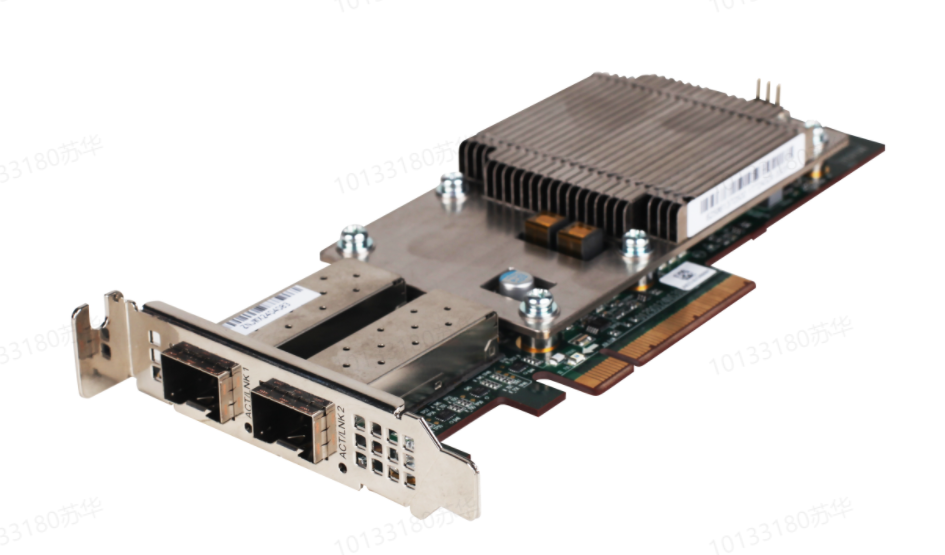


图2.1-2

NX E312网卡以如图2.1-3为例，E312网卡的网口名称按如下顺序定义：



图2.1-3

### **2.2 安装E310/E312到服务器的高性能riser卡槽**

说明：

智能网卡建议安装于x16 PCIE卡槽中

步骤

警示

安全警示：请操作硬件设备时正确佩戴防静电腕带或防静电手套。

安全警示：请搬运服务器设备时，注意人身安全，谨防受伤。

在HG3服务器上安装智能网卡时，推荐将智能网卡安装到Slot4槽位或Slot7槽位

如下图2.2-1所示

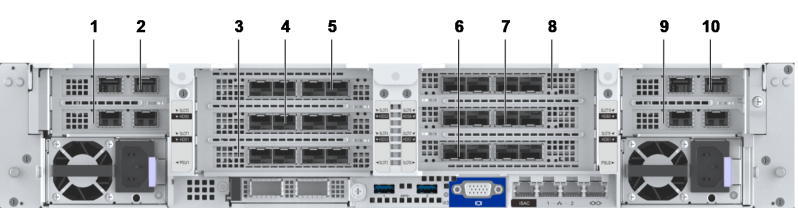


图2.2-1R5300 G4X/R5930 G2服务器卡槽示意图（请以实际规格为准）

在R5300 G4X/R5930 G2服务器上安装智能网卡时，推荐将智能网卡安装到Slot4槽位或Slot7槽位。即对应的3槽riser卡的中间槽位，标准情况下是x16的高性能卡槽。

如下图2.2-2所示，按步骤将智能网卡安装到riser卡槽中并锁紧螺丝。

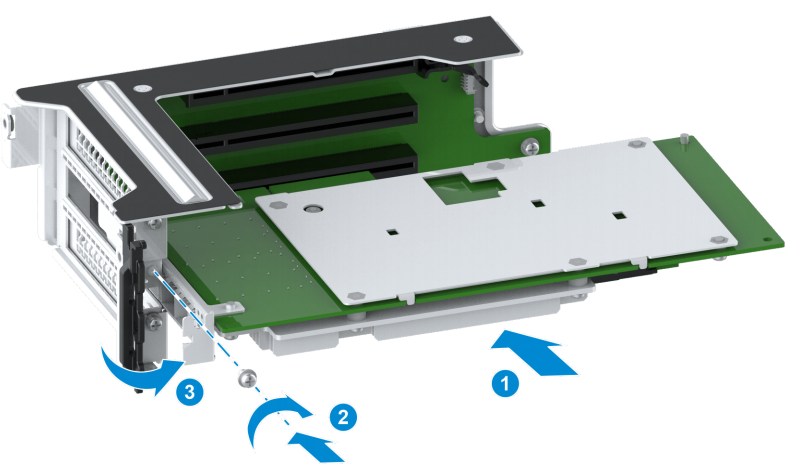


图2.2-2

注：如果安装到性能较差的x8或者x4卡槽，会影响峰值性能。

如何确认安装的卡槽是高性能卡槽：

|  |
| --- |
| [root@Computer-5310-24 vtu]# lspci -s 0002:01:00.0 -vvv |grep -i width  LnkCap: Port #0, Speed 16GT/s, Width x16, ASPM L1, Exit Latency L1 <64us  LnkSta: Speed 16GT/s (ok), Width x16 (ok)  PASIDCap: Exec+ Priv+, Max PASID Width: 14  [root@Computer-5310-24 vtu]#  #pci号是智能网卡的pci号，可以通过lspci|grep ZTE获取，取第一个00.0  #此处LnkCap为连接能力，LnkSta为连接状态，均需为x16状态 |

### 2.3 BMC确认信息-暂不支持，待补充

登录服务器bmc页面，查看网卡设备，确认E310网卡正常识别为2\*25G的网卡，如图2.3-1：



图2.3-1

注：正常情况下中兴5300G3、5300G4、8500G4、5930G2、5300G4X等服务器均能正常识别；如果出现不识别情况，可以观察智能网卡是否有绿灯亮起，或装完os后查看pcie设备是否存在，或升级BMC版本后查看。

登录服务器bmc页面，查看网卡设备，确认E312网卡正常识别为2\*100G的网卡，如图2.3-2：



图2.3-2

注：正常情况下HG3、中兴5300G3、5300G4、8500G4、5930G2、5300G4X等服务器均能正常识别；如果出现不识别情况，可以观察智能网卡是否有绿灯亮起，或装完os后查看pcie设备是否存在，或升级BMC版本后查看。

### 2.4 物理连接

根据组网接线需求接入机房服务器集群，并将业务网络光纤连接到E310/E312的网口。

E310/E312网卡支持1口单工，2口bond，请根据需要进行光纤连接。1,2号口将对应操作系统中的ens2f0,ens2f1（网卡名称随操作系统和槽位而变化，但网口顺序不变）

注：E310支持25G和10G光模块自适应，一般情况下均使用25G。

E312支持100G和200G光模块自适应，一般情况下均使用100G。

### 2.5 交换机配置

说明：

E312支持RDMA功能，需要支持RDMA的交换机

步骤

* **以中兴5960X交换机为例：**

|  |
| --- |
| TOR-S-F08-02(config-if-xxvgei-0/1/1/7)#show this  !<if-intf>  mtu 9216  no shutdown  !</if-intf>  !<port-physical-config>  fec-eth disable  !</port-physical-config> |

## 软件部署配置

说明：

前置条件：需要部署能够正常安装运行驱动的服务器环境，正常运行ovs+dpdk驱动。

步骤

1. **通过rpm命令安装解耦卡内核态驱动**

|  |
| --- |
| [root@Computer-5310-23 E310\_V2.24.20.02B05\_1187\_20240718]# rpm -ivh zxdh-CGSL-6.06-aarch64\_zxdh-eth-2.24.20.02-20240718021743.cgsl6.06.04.aarch64.rpm  Verifying... ################################# [100%]  Preparing... ################################# [100%]  Updating / installing...  1:zxdh-eth-2.24.20.02-2024071802174################################# [100%]  original pci.ids saved in /usr/local/share/zxdh-eth  You must update your initrd manually for changes to take place, please execute the command: dracut --force  [root@Computer-5310-23 E310\_V2.24.20.02B05\_1187\_20240718]# modprobe zxdh\_en\_aux  [root@Computer-5310-23 E310\_V2.24.20.02B05\_1187\_20240718]# rpm -qa|grep zxdh  zxdh-eth-2.24.20.02-20240718021743.cgsl6.06.04.aarch64  [root@Computer-5310-23 E310\_V2.24.20.02B05\_1187\_20240718]# lsmod|grep zxdh  zxdh\_en\_aux 278528 0  zxdh\_pf 200704 1 zxdh\_en\_aux  zxdh\_auxiliary 16384 2 zxdh\_en\_aux,zxdh\_pf  zxdh\_tsn 40960 2 zxdh\_en\_aux,zxdh\_pf  zxdh\_ptp 45056 2 zxdh\_en\_aux,zxdh\_pf  zxdh\_np 24829952 2 zxdh\_en\_aux,zxdh\_pf  zxdh\_cmd 5840896 4 zxdh\_np,zxdh\_en\_aux,zxdh\_ptp,zxdh\_pf  [root@Computer-5310-23 E310\_V2.24.20.02B05\_1187\_20240718]# |

1. **确认PF驱动正常生效，如下文：enP2s7f0、enP2s7f1为其中一对E312网卡，enP6s8f0、enP6s8f1为另一对E312网卡**

|  |
| --- |
| [root@Computer-5310-23 vtu]# ethtool -i enP2s7f0  driver: zxdh\_pf  version: 2.24.20.02-20240718021743  firmware-version: E312-V2.24.20.02B04.1090  expansion-rom-version:  bus-info: 0002:01:00.0  supports-statistics: yes  supports-test: no  supports-eeprom-access: no  supports-register-dump: yes  supports-priv-flags: yes  [root@Computer-5310-23 vtu]# ethtool -i enP2s7f1  driver: zxdh\_pf  version: 2.24.20.02-20240718021743  firmware-version: E312-V2.24.20.02B04.1090  expansion-rom-version:  bus-info: 0002:01:00.1  supports-statistics: yes  supports-test: no  supports-eeprom-access: no  supports-register-dump: yes  supports-priv-flags: yes  [root@Computer-5310-23 vtu]# ethtool -i enP6s8f0  driver: zxdh\_pf  version: 2.24.20.02-20240718021743  firmware-version: E312-V2.24.20.02B04.1090  expansion-rom-version:  bus-info: 0006:01:00.0  supports-statistics: yes  supports-test: no  supports-eeprom-access: no  supports-register-dump: yes  supports-priv-flags: yes  [root@Computer-5310-23 vtu]# ethtool -i enP6s8f1  driver: zxdh\_pf  version: 2.24.20.02-20240718021743  firmware-version: E312-V2.24.20.02B04.1090  expansion-rom-version:  bus-info: 0006:01:00.1  supports-statistics: yes  supports-test: no  supports-eeprom-access: no  supports-register-dump: yes  supports-priv-flags: yes  [root@Computer-5310-23 vtu]# |

1. **指定PF0打开VF**

|  |
| --- |
| [root@inic163 vtu]# lspci -nn |grep ZTE  b1:00.0 Ethernet controller [0200]: ZTE Corporation ZXiNIC XI410 [1cf2:820f]  b1:00.1 Ethernet controller [0200]: ZTE Corporation Device [1cf2:800b]  b1:00.4 Ethernet controller [0200]: ZTE Corporation ZXiNIC XI410 Virtual Function [1cf2:800c]  b1:00.5 Ethernet controller [0200]: ZTE Corporation ZXiNIC XI410 Virtual Function [1cf2:800c]  b1:00.6 Ethernet controller [0200]: ZTE Corporation ZXiNIC XI410 Virtual Function [1cf2:800c]  #注：  PF0对应的device id为820f，  PF1对应的device id为800b，  VF对应的device id为800c（仅在执行如下打开vf命令后出现）  [root@inic163 vtu]# echo 64 > /sys/bus/pci/devices/0000\:b1\:00.0/sriov\_numvfs |

1. **VF绑定vfio驱动**

|  |
| --- |
| #注：请以实际打开的vf pci号为准  [root@inic163 vtu]# dpdk\_devbind -b vfio-pci b1:00.4 b1:00.5 b1:00.6 b1:00.7 b1:01.0 b1:01.1 b1:01.2 b1:01.3 b1:01.4 b1:01.5 b1:01.6 b1:01.7 b1:02.0 b1:02.1 b1:02.2 b1:02.3 b1:02.4 b1:02.5 b1:02.6 b1:02.7 b1:03.0 b1:03.1 b1:03.2 b1:03.3 b1:03.4 b1:03.5 b1:03.6 b1:03.7 b1:04.0 b1:04.1 b1:04.2 b1:04.3 b1:04.4 b1:04.5 b1:04.6 b1:04.7 b1:05.0 b1:05.1 b1:05.2 b1:05.3 b1:05.4 b1:05.5 b1:05.6 b1:05.7 b1:06.0 b1:06.1 b1:06.2 b1:06.3 b1:06.4 b1:06.5 b1:06.6 b1:06.7 b1:07.0 b1:07.1 b1:07.2 b1:07.3 b1:07.4 b1:07.5 b1:07.6 b1:07.7 b1:08.0 b1:08.1 b1:08.2 b1:08.3 |

1. **如无需配置bond，则跳过6，7小节**
2. **示例：配置linuxbond**-2口bond（与步骤7可选）

|  |
| --- |
| [root@inic163 vtu]# ip link add bond1 type bond mode 802.3ad miimon 100  [root@inic163 vtu]# ifconfig bond1 up  [root@inic163 vtu]# ifconfig ens7f0 down  [root@inic163 vtu]# ifconfig ens7f1down  [root@inic163 vtu]# ip link set ens7f0 master bond1  [root@inic163 vtu]# ip link set ens7f1 master bond1  [root@inic163 vtu]# cat /proc/net/bonding/bond1  Ethernet Channel Bonding Driver: v3.7.1 (April 27, 2011)  Bonding Mode: IEEE 802.3ad Dynamic link aggregation  Transmit Hash Policy: layer2 (0)  MII Status: up  MII Polling Interval (ms): 100  Up Delay (ms): 0  Down Delay (ms): 0  Peer Notification Delay (ms): 0  802.3ad info  LACP rate: fast  Min links: 0  Aggregator selection policy (ad\_select): stable  System priority: 65535  System MAC address: 20:20:11:09:03:1d  Active Aggregator Info:  Aggregator ID: 3  Number of ports: 2  Actor Key: 21  Partner Key: 769  Partner Mac Address: 00:00:00:15:01:81  Slave Interface: ens7f0  MII Status: up  Speed: 25000 Mbps  Duplex: full  Link Failure Count: 0  Permanent HW addr: 20:20:11:09:03:1d  Slave queue ID: 0  Aggregator ID: 3  Actor Churn State: none  Partner Churn State: none  Actor Churned Count: 0  Partner Churned Count: 0  details actor lacp pdu:  system priority: 65535  system mac address: 20:20:11:09:03:1d  port key: 21  port priority: 255  port number: 1  port state: 63  details partner lacp pdu:  system priority: 100  system mac address: 00:00:00:15:01:81  oper key: 769  port priority: 32768  port number: 8202  port state: 61  Slave Interface: ens7f1  MII Status: up  Speed: 25000 Mbps  Duplex: full  Link Failure Count: 0  Permanent HW addr: 20:20:11:09:03:1e  Slave queue ID: 0  Aggregator ID: 3  Actor Churn State: none  Partner Churn State: none  Actor Churned Count: 0  Partner Churned Count: 0  details actor lacp pdu:  system priority: 65535  system mac address: 20:20:11:09:03:1d  port key: 21  port priority: 255  port number: 2  port state: 63  details partner lacp pdu:  system priority: 100  system mac address: 00:00:00:15:01:81  oper key: 769  port priority: 32768  port number: 12290  port state: 63 |

1. **示例：配置linuxbond**-4口bond（与步骤6可选）

|  |
| --- |
| [root@inic163 vtu]# ip link add bond1 type bond mode 802.3ad miimon 100  [root@inic163 vtu]# ifconfig bond1 up  [root@inic163 vtu]# ifconfig ens7f0 down  [root@inic163 vtu]# ifconfig ens7f1down  [root@inic163 vtu]# ifconfig ens7f2 down  [root@inic163 vtu]# ifconfig ens7f3 down  [root@inic163 vtu]# ip link set ens7f0 master bond1  [root@inic163 vtu]# ip link set ens7f1 master bond1  [root@inic163 vtu]# ip link set ens7f2 master bond1  [root@inic163 vtu]# ip link set ens7f3 master bond1  [root@inic163 vtu]# cat /proc/net/bonding/bond1  Ethernet Channel Bonding Driver: v3.7.1 (April 27, 2011)  Bonding Mode: IEEE 802.3ad Dynamic link aggregation  Transmit Hash Policy: layer2 (0)  MII Status: up  MII Polling Interval (ms): 100  Up Delay (ms): 0  Down Delay (ms): 0  Peer Notification Delay (ms): 0  802.3ad info  LACP rate: fast  Min links: 0  Aggregator selection policy (ad\_select): stable  System priority: 65535  System MAC address: 20:20:11:09:03:1d  Active Aggregator Info:  Aggregator ID: 3  Number of ports: 4  Actor Key: 21  Partner Key: 769  Partner Mac Address: 00:00:00:15:01:81  Slave Interface: ens7f0  MII Status: up  Speed: 25000 Mbps  Duplex: full  Link Failure Count: 0  Permanent HW addr: 20:20:11:09:03:1d  Slave queue ID: 0  Aggregator ID: 3  Actor Churn State: none  Partner Churn State: none  Actor Churned Count: 0  Partner Churned Count: 0  details actor lacp pdu:  system priority: 65535  system mac address: 20:20:11:09:03:1d  port key: 21  port priority: 255  port number: 1  port state: 63  details partner lacp pdu:  system priority: 100  system mac address: 00:00:00:15:01:81  oper key: 769  port priority: 32768  port number: 8202  port state: 61  Slave Interface: ens7f1  MII Status: up  Speed: 25000 Mbps  Duplex: full  Link Failure Count: 0  Permanent HW addr: 20:20:11:09:03:1e  Slave queue ID: 0  Aggregator ID: 3  Actor Churn State: none  Partner Churn State: none  Actor Churned Count: 0  Partner Churned Count: 0  details actor lacp pdu:  system priority: 65535  system mac address: 20:20:11:09:03:1d  port key: 21  port priority: 255  port number: 2  port state: 63  details partner lacp pdu:  system priority: 100  system mac address: 00:00:00:15:01:81  oper key: 769  port priority: 32768  port number: 12290  port state: 63  Slave Interface: ens7f2  MII Status: up  Speed: 25000 Mbps  Duplex: full  Link Failure Count: 0  Permanent HW addr: 20:20:11:09:03:1f  Slave queue ID: 0  Aggregator ID: 3  Actor Churn State: none  Partner Churn State: none  Actor Churned Count: 0  Partner Churned Count: 0  details actor lacp pdu:  system priority: 65535  system mac address: 20:20:11:09:03:1d  port key: 21  port priority: 255  port number: 3  port state: 63  details partner lacp pdu:  system priority: 100  system mac address: 00:00:00:15:01:81  oper key: 769  port priority: 32768  port number: 8202  port state: 63  Slave Interface: ens7f3  MII Status: up  Speed: 25000 Mbps  Duplex: full  Link Failure Count: 0  Permanent HW addr: 20:20:11:09:03:20  Slave queue ID: 0  Aggregator ID: 3  Actor Churn State: none  Partner Churn State: none  Actor Churned Count: 0  Partner Churned Count: 0  details actor lacp pdu:  system priority: 65535  system mac address: 20:20:11:09:03:1d  port key: 21  port priority: 255  port number: 4  port state: 63  details partner lacp pdu:  system priority: 100  system mac address: 00:00:00:15:01:81  oper key: 769  port priority: 32768  port number: 8202  port state: 63 |

1. **将PF1对应的PCI信息透传给虚交换**

|  |
| --- |
| #注：请在虚交换配置流程中进行绑定  [root@inic163 vtu]# dpdk\_devbind -s  Network devices using DPDK-compatible driver  ============================================  0000:b1:00.1 'Device' drv=vfio-pci unused= |

1. **虚交换添加PF1到网桥上，并指定对应网口设备类型为dpdk，pci为0000:b1:00.1**

|  |
| --- |
| Bridge "br-bond1"  Port "bond1"  Interface "bond1"  type: dpdk  options: {dpdk-devargs="0000:b1:00.1", n\_rxq="1"}  Port "br-bond1"  Interface "br-bond1"  type: internal  #如果是不做bond口，则为：  Bridge "br-ens2f0"  Port "ens2f0"  Interface "ens2f0"  type: dpdk  options: {dpdk-devargs="0000:b1:00.1", n\_rxq="1"}  Port "br-ens2f0"  Interface "br-ens2f0"  type: internal |

## 版本升级

### 驱动版本升级

#### 4.1.1 rpm安装包升级的方式

说明：

使用rpm安装包升级的方式进行升级

前置条件：正确获取和固件匹配的驱动文件，确保环境支持安装。

步骤

1. **上传rpm文件到智能网卡所在服务器操作系统。**
2. **切换root权限用户操作。**
3. **执行如下命令：**

|  |
| --- |
| [root@Computer-5310-23 E310\_V2.24.20.02B05\_1187\_20240718]# rpm -ivh zxdh-CGSL-6.06-aarch64\_zxdh-eth-2.24.20.02-20240718021743.cgsl6.06.04.aarch64.rpm  Verifying...                          ################################# [100%]  Preparing...                          ################################# [100%]  Updating / installing...     1:zxdh-eth-2.24.20.02-2024071802174################################# [100%]  original pci.ids saved in /usr/local/share/zxdh-eth  You must update your initrd manually for changes to take place, please execute the command: dracut --force  [root@Computer-5310-23 E310\_V2.24.20.02B05\_1187\_20240718]# modprobe zxdh\_en\_aux  [root@Computer-5310-23 E310\_V2.24.20.02B05\_1187\_20240718]# rpm -qa|grep zxdh  zxdh-eth-2.24.20.02-20240718021743.cgsl6.06.04.aarch64  [root@Computer-5310-23 E310\_V2.24.20.02B05\_1187\_20240718]# lsmod|grep zxdh  zxdh\_en\_aux           278528  0  zxdh\_pf               200704  1 zxdh\_en\_aux  zxdh\_auxiliary         16384  2 zxdh\_en\_aux,zxdh\_pf  zxdh\_tsn               40960  2 zxdh\_en\_aux,zxdh\_pf  zxdh\_ptp               45056  2 zxdh\_en\_aux,zxdh\_pf  zxdh\_np             24829952  2 zxdh\_en\_aux,zxdh\_pf  zxdh\_cmd             5840896  4 zxdh\_np,zxdh\_en\_aux,zxdh\_ptp,zxdh\_pf  [root@Computer-5310-23 E310\_V2.24.20.02B05\_1187\_20240718]# |

#### 4.1.2 重新加载ko文件的方式-未提供

说明：

使用重新加载ko文件的方式进行升级。

前置条件：正确获取新的驱动ko文件，并进行sha校验

步骤

1. **上传ko文件到智能网卡所在服务器操作系统。**
2. **切换root权限用户操作。**
3. **执行如下命令：**

|  |
| --- |
| [root@inic163 vtu]# insmod igb\_uio.ko  [root@inic163 vtu]# insmod xi410.ko  [root@inic163 vtu]# dpdk\_devbind -b igb\_uio b1:00.1  [root@inic163 vtu]# dpdk\_devbind -b xi410\_pf b1:00.0 |

### fireware升级指导

#### Dhtool升级fireware指导

说明：一般首次升级是升级128M全版本的大bin文件, 使用dhburn.sh是一并更新配置参数区,即为了满足ddr依赖ddr\_cfg.bin以及pcie依赖board\_cfg.bin.

前置条件：正确获取fireware升级dhtool工具包（Dinghai项目制品库发布），放置待升级的firmware\_update\_xxx.bin包和dhtool同目录。

步骤

1. **上传对应操作系统类型的dhtool工具包到所在服务器操作系统，并切换到root操作。**
2. **确认标卡E310/E312的网口名（本文档以E312为例说明），使用dhtool升级fireware\_update bin包**

|  |
| --- |
| [root@Computer-5310-23 vtu]# lspci -nn|grep ZTE  0002:01:00.0 Ethernet controller [0200]: ZTE Corporation NX E312 SRIOV PF Ethernet Controller [1cf2:8049] (rev 01)  0002:01:00.1 Ethernet controller [0200]: ZTE Corporation NX E312 SRIOV PF Ethernet Controller [1cf2:8049] (rev 01)  0006:01:00.0 Ethernet controller [0200]: ZTE Corporation NX E312 SRIOV PF Ethernet Controller [1cf2:8049] (rev 01)  0006:01:00.1 Ethernet controller [0200]: ZTE Corporation NX E312 SRIOV PF Ethernet Controller [1cf2:8049] (rev 01)  [root@Computer-5310-23 vtu]#  [root@Computer-5310-23 vtu]# ifconfig -a|grep enP  enP1s66f0: flags=4099<UP,BROADCAST,MULTICAST> mtu 1500  enP1s66f1: flags=4099<UP,BROADCAST,MULTICAST> mtu 1500  enP2s7f0: flags=4099<UP,BROADCAST,MULTICAST> mtu 1500  enP2s7f1: flags=4163<UP,BROADCAST,RUNNING,MULTICAST> mtu 1500  enP6s6f0: flags=6211<UP,BROADCAST,RUNNING,SLAVE,MULTICAST> mtu 1500  enP6s6f1: flags=6211<UP,BROADCAST,RUNNING,SLAVE,MULTICAST> mtu 1500  enP6s8f0: flags=4099<UP,BROADCAST,MULTICAST> mtu 1500  enP6s8f1: flags=4099<UP,BROADCAST,MULTICAST> mtu 1500  enP7s9f0: flags=6147<UP,BROADCAST,SLAVE,MULTICAST> mtu 9000  enP7s9f1: flags=6147<UP,BROADCAST,SLAVE,MULTICAST> mtu 9000  [root@Computer-5310-23 vtu]# |

1. **使用dhtool工具进行fireware版本**

|  |
| --- |
| [root@Computer-5310-23 dhtools]# ./dhtool fwupdate enP2s7f0 all firmware\_update\_ZXDH-FW-E312-V2.24.20.02B05.1187.bin  [=================================== ]100%|reading part 2 sda\_mp8 |Elapsed Time: 01:43  \*\*\*\*dh firmware has write success, please reset(use BMC or ./dhtool reset enP2s7f0 level 3) to active!\*\*\*\*  [root@Computer-5310-23 dhtools]#  #注：文件名以实际安装包为准  #升级期间建议停止所有服务器操作。  #升级过程大概2min左右，最终出现“dh firmware has write success”即为成功。 |

1. **使用dhtool升级board\_cfg bin包（本文档以E312为例说明）**

|  |
| --- |
| [root@Computer-5310-23 dhtools]# ./dhtool fput enP2s7f0 board\_user zios\_board\_cfg\_zxnic\_e312.bin  arc =2.argp[0] board\_user argp[1] zios\_board\_cfg\_zxnic\_e312.bin  fwupd\_info:[mts\_fput\_arg\_parse][517]arc =2.argp[0] board\_user argp[1] zios\_board\_cfg\_zxnic\_e312.bin  fwupd\_info:[mts\_setup\_risc\_flash][343]cmd =1 addr=0x6100000 size=77843  fwupd\_info:[mts\_fput\_recv][602]data\_len14 cmd1  fwupd\_info:[mts\_send\_bin\_to\_risc][383]blks= 39 left\_len=77843  [==================================================] 100% | Elapsed Time: 00:00  fwupd\_info:[mts\_fput\_recv][602]data\_len14 cmd1  fwupd\_info:[mts\_fput\_recv][602]data\_len32 cmd2  fwupd\_info:[mts\_fput\_recv][610]  /\*\*\*\*\*fput sucess! sys will exit\*\*\*\*/  [root@Computer-5310-23 dhtools]#  #注：文件名以实际安装包为准  #升级期间建议停止所有服务器操作。  #升级过程大概5s左右，最终出现“ /\*\*\*\*\*fput sucess! sys will exit\*\*\*\*/”即为成功。 |

1. **使用dhtool工具进行fireware版本升级**

|  |
| --- |
| [root@Computer-5310-23 dhtools]# ./dhtool fwupdate enP2s7f0 all firmware\_update\_ZXDH-FW-E312-V2.24.20.02B05.1187.bin  [=================================== ]100%|reading part 2 sda\_mp8 |Elapsed Time: 01:43  \*\*\*\*dh firmware has write success, please reset(use BMC or ./dhtool reset enP2s7f0 level 3) to active!\*\*\*\*  [root@Computer-5310-23 dhtools]#  #注：文件名以实际安装包为准  #升级期间建议停止所有服务器操作。  #升级过程大概2min左右，最终出现“dh firmware has write success”即为成功。 |

1. **掉电重启服务器**

注意并不是reboot，是power cycle，或者拔电源进行重启。

1. **确认升级完成**

|  |
| --- |
| [root@Computer-5310-23 dhtools]# ./dhtool fwupdate enP2s7f0 version  ====DPU VERSION===========================  ====ZXDH-FW-E312-V2.24.20.02B05.1187====  ====np version num 12.34.7856========  ====rdma version num 1.0. 5========  ====mctx version num 1.0. 5========  ====mcrx version num 1.0. 5========  ====gmac\_mp1 version num 1.0. 5========  ====gmac\_mp2 version num 1.0. 5========  ====gmac\_mp3 version num 1.0. 5========  ====pcie\_serdes version num 1.0. 5========  ====eth\_serdes version num 1.0. 5========  ====oprom version num 1.1. 3========  ====sda\_mp0\_7 version num 1.0. 5========  ====sda\_mp8 version num 1.0. 5========  ==========================================  [root@Computer-5310-23 dhtools]# |

#### Dhburn升级fireware指导

说明： 使用dhtool烧录时只烧录了版本区，board\_cfg.bin如果有变化需要额外再单独烧。

前置条件：正确获取fireware升级dhtool工具包（Dinghai项目制品库发布），放置待升级的firmware\_update\_xxx.bin包和dhtool同目录。

步骤

1. **上传对应操作系统类型的dhtool工具包到所在服务器操作系统，并切换到root操作。**
2. **确认标卡E310/E312的网口名（本文档以E312为例说明）**

|  |
| --- |
| [root@Computer-5310-23 vtu]# lspci -nn|grep ZTE  0002:01:00.0 Ethernet controller [0200]: ZTE Corporation NX E312 SRIOV PF Ethernet Controller [1cf2:8049] (rev 01)  0002:01:00.1 Ethernet controller [0200]: ZTE Corporation NX E312 SRIOV PF Ethernet Controller [1cf2:8049] (rev 01)  0006:01:00.0 Ethernet controller [0200]: ZTE Corporation NX E312 SRIOV PF Ethernet Controller [1cf2:8049] (rev 01)  0006:01:00.1 Ethernet controller [0200]: ZTE Corporation NX E312 SRIOV PF Ethernet Controller [1cf2:8049] (rev 01)  [root@Computer-5310-23 vtu]#  [root@Computer-5310-23 vtu]# ifconfig -a|grep enP  enP1s66f0: flags=4099<UP,BROADCAST,MULTICAST> mtu 1500  enP1s66f1: flags=4099<UP,BROADCAST,MULTICAST> mtu 1500  enP2s7f0: flags=4099<UP,BROADCAST,MULTICAST> mtu 1500  enP2s7f1: flags=4163<UP,BROADCAST,RUNNING,MULTICAST> mtu 1500  enP6s6f0: flags=6211<UP,BROADCAST,RUNNING,SLAVE,MULTICAST> mtu 1500  enP6s6f1: flags=6211<UP,BROADCAST,RUNNING,SLAVE,MULTICAST> mtu 1500  enP6s8f0: flags=4099<UP,BROADCAST,MULTICAST> mtu 1500  enP6s8f1: flags=4099<UP,BROADCAST,MULTICAST> mtu 1500  enP7s9f0: flags=6147<UP,BROADCAST,SLAVE,MULTICAST> mtu 9000  enP7s9f1: flags=6147<UP,BROADCAST,SLAVE,MULTICAST> mtu 9000  [root@Computer-5310-23 vtu]# |

1. **使用dhburn工具进行fireware版本升级**

|  |
| --- |
| [root@Computer-5310-23 dhtools]# ./dhburn.sh zios enP2s7f0 firmware\_ZXDH-FW-E312-V2.24.20.02B05.1187.bin  arc =2.argp[0] seg0\_version1 argp[1] tmp\_enP2s7f0/seg0\_version1.bin  fwupd\_info:[mts\_fput\_arg\_parse][517]arc =2.argp[0] seg0\_version1 argp[1] tmp\_enP2s7f0/seg0\_version1.bin  fwupd\_info:[mts\_setup\_risc\_flash][343]cmd =1 addr=0x 0 size=50331648  fwupd\_info:[mts\_fput\_recv][602]data\_len14 cmd1  fwupd\_info:[mts\_send\_bin\_to\_risc][383]blks= 25166 left\_len=50331648  [==================================================] 100% | Elapsed Time: 05:15  fwupd\_info:[mts\_fput\_recv][602]data\_len14 cmd1  fwupd\_info:[mts\_fput\_recv][602]data\_len32 cmd2  fwupd\_info:[mts\_fput\_recv][610]  /\*\*\*\*\*fput sucess! sys will exit\*\*\*\*/  arc =2.argp[0] seg1\_version2 argp[1] tmp\_enP2s7f0/seg1\_version2.bin  fwupd\_info:[mts\_fput\_arg\_parse][517]arc =2.argp[0] seg1\_version2 argp[1] tmp\_enP2s7f0/seg1\_version2.bin  fwupd\_info:[mts\_setup\_risc\_flash][343]cmd =1 addr=0x3000000 size=50331648  fwupd\_info:[mts\_fput\_recv][602]data\_len14 cmd1  fwupd\_info:[mts\_send\_bin\_to\_risc][383]blks= 25166 left\_len=50331648  [==================================================] 100% | Elapsed Time: 05:17  fwupd\_info:[mts\_fput\_recv][602]data\_len14 cmd1  fwupd\_info:[mts\_fput\_recv][602]data\_len32 cmd2  fwupd\_info:[mts\_fput\_recv][610]  /\*\*\*\*\*fput sucess! sys will exit\*\*\*\*/  arc =2.argp[0] seg2\_0\_specspara argp[1] tmp\_enP2s7f0/seg2.0\_specspara.bin  fwupd\_info:[mts\_fput\_arg\_parse][517]arc =2.argp[0] seg2\_0\_specspara argp[1] tmp\_enP2s7f0/seg2.0\_specspara.bin  fwupd\_info:[mts\_setup\_risc\_flash][343]cmd =1 addr=0x6000000 size=2097152  fwupd\_info:[mts\_fput\_recv][602]data\_len14 cmd1  fwupd\_info:[mts\_send\_bin\_to\_risc][383]blks= 1049 left\_len=2097152  [==================================================] 100% | Elapsed Time: 00:13  fwupd\_info:[mts\_fput\_recv][602]data\_len14 cmd1  fwupd\_info:[mts\_fput\_recv][602]data\_len32 cmd2  fwupd\_info:[mts\_fput\_recv][610]  /\*\*\*\*\*fput sucess! sys will exit\*\*\*\*/  arc =2.argp[0] seg2\_1\_rdma argp[1] tmp\_enP2s7f0/seg2.1\_rdma.bin  fwupd\_info:[mts\_fput\_arg\_parse][517]arc =2.argp[0] seg2\_1\_rdma argp[1] tmp\_enP2s7f0/seg2.1\_rdma.bin  fwupd\_info:[mts\_setup\_risc\_flash][343]cmd =1 addr=0x6280000 size=2621440  fwupd\_info:[mts\_fput\_recv][602]data\_len14 cmd1  fwupd\_info:[mts\_send\_bin\_to\_risc][383]blks= 1311 left\_len=2621440  [==================================================] 100% | Elapsed Time: 00:16  fwupd\_info:[mts\_fput\_recv][602]data\_len14 cmd1  fwupd\_info:[mts\_fput\_recv][602]data\_len32 cmd2  fwupd\_info:[mts\_fput\_recv][610]  /\*\*\*\*\*fput sucess! sys will exit\*\*\*\*/  [165] Burn firmware\_ZXDH-FW-E312-V2.24.20.02B05.1187.bin success.  [root@Computer-5310-23 dhtools]#  #注：文件名以实际安装包为准  #升级期间建议停止所有服务器操作。  #升级过程大概2min左右，最终出现“Burn firmware\_xxx.bin success.”即为成功。 |

1. **掉电重启服务器**

注意并不是reboot，是power cycle，或者拔电源进行重启。

1. **确认升级完成**

|  |
| --- |
| [root@Computer-5310-23 dhtools]# ./dhtool fwupdate enP2s7f0 version  ====DPU VERSION===========================  ====ZXDH-FW-E312-V2.24.20.02B05.1187====  ====np version num 12.34.7856========  ====rdma version num 1.0. 5========  ====mctx version num 1.0. 5========  ====mcrx version num 1.0. 5========  ====gmac\_mp1 version num 1.0. 5========  ====gmac\_mp2 version num 1.0. 5========  ====gmac\_mp3 version num 1.0. 5========  ====pcie\_serdes version num 1.0. 5========  ====eth\_serdes version num 1.0. 5========  ====oprom version num 1.1. 3========  ====sda\_mp0\_7 version num 1.0. 5========  ====sda\_mp8 version num 1.0. 5========  ==========================================  [root@Computer-5310-23 dhtools]# |

#### Mac地址烧结指导

说明：

前置条件：正确获取fireware升级dhtool工具包（Dinghai项目制品库发布）

步骤

1. **上传对应操作系统类型的dhtool工具包到所在服务器操作系统，并切换到root操作。**
2. **查看E310/E312标卡当前的mac地址（本文档以E312为例说明）**

|  |
| --- |
| [root@Computer-5310-23 dhtools]# ./dhtool mac\_info enP2s7f0 mac\_info  mac\_addr\_get\_info: [dhtool\_mac\_addr\_get\_msg][46] mac\_addr\_get\_reps.mac\_addr\_num = 2  mac\_addr\_get\_info: [dhtool\_mac\_addr\_get\_msg][47] mac addr get success.  mac\_addr[0]=ff:ff:ff:ff:ff:ff  mac\_addr[1]=ff:ff:ff:ff:ff:ff  [root@Computer-5310-23 dhtools]# ifconfig enP2s7f0  enP2s7f0: flags=4163<UP,BROADCAST,RUNNING,MULTICAST> mtu 1500  inet6 fe80::ca24:73ff:fe3e:7d7e prefixlen 64 scopeid 0x20<link>  ether c8:24:73:3e:7d:7e txqueuelen 1000 (Ethernet)  RX packets 0 bytes 0 (0.0 B)  RX errors 0 dropped 0 overruns 0 frame 0  TX packets 139 bytes 12466 (12.1 KiB)  TX errors 0 dropped 0 overruns 0 carrier 0 collisions 0  [root@Computer-5310-23 dhtools]# ifconfig enP2s7f1  enP2s7f1: flags=4163<UP,BROADCAST,RUNNING,MULTICAST> mtu 1500  inet6 fe80::481e:3dff:fef1:dc3e prefixlen 64 scopeid 0x20<link>  ether 4a:1e:3d:f1:dc:3e txqueuelen 1000 (Ethernet)  RX packets 0 bytes 0 (0.0 B)  RX errors 0 dropped 0 overruns 0 frame 0  TX packets 9 bytes 742 (742.0 B)  TX errors 0 dropped 0 overruns 0 carrier 0 collisions 0  [root@Computer-5310-23 dhtools]#  #注：查出来的mac地址为全ff，表示mac没有烧结 |

1. **使用dhtool工具进行mac地址烧结**

|  |
| --- |
| [root@Computer-5310-23 dhtools]# ./dhmac.sh enP2s7f0 28:7b:09:ee:23:0b 2  ./dhtool eeupdate enP2s7f0 mac=28:7b:09:ee:23:0b nic=0  sn\_mac\_addr\_send\_info: [dhtool\_sn\_mac\_addr\_send][220] is called!  sn\_mac\_addr\_send\_info: [dhtool\_sn\_mac\_addr\_send\_msg][134] sn or mac addr send success.  ./dhtool eeupdate enP2s7f0 mac=28:7b:09:ee:23:0c nic=1  sn\_mac\_addr\_send\_info: [dhtool\_sn\_mac\_addr\_send][220] is called!  sn\_mac\_addr\_send\_info: [dhtool\_sn\_mac\_addr\_send\_msg][134] sn or mac addr send success.  28:7b:09:ee:23:0b  28:7b:09:ee:23:0c  All MAC addresses are correct.  [root@Computer-5310-23 dhtools]#  #注：文件名以实际安装包为准  #mac烧结期间期间建议停止所有服务器操作。 |

1. **查看E310/E312标卡mac地址是否烧结成功（本文档以E312为例说明）**

|  |
| --- |
| [root@Computer-5310-23 dhtools]# ./dhtool mac\_info enP6s8f0 mac\_info  mac\_addr\_get\_info: [dhtool\_mac\_addr\_get\_msg][46] mac\_addr\_get\_reps.mac\_addr\_num = 2  mac\_addr\_get\_info: [dhtool\_mac\_addr\_get\_msg][47] mac addr get success.  mac\_addr[0]=28:7b:09:ee:23:0d  mac\_addr[1]=28:7b:09:ee:23:0e  [root@Computer-5310-23 dhtools]# |

1. **掉电重启服务器**

注意并不是reboot，是power cycle，或者拔电源进行重启。

1. **服务器重启后，确认mac地址为烧结的mac地址**

|  |
| --- |
| [root@Computer-5310-23 dhtools]# ./dhtool mac\_info enP2s7f0 mac\_info  mac\_addr\_get\_info: [dhtool\_mac\_addr\_get\_msg][46] mac\_addr\_get\_reps.mac\_addr\_num = 2  mac\_addr\_get\_info: [dhtool\_mac\_addr\_get\_msg][47] mac addr get success.  mac\_addr[0]=28:7b:09:ee:23:0b  mac\_addr[1]=28:7b:09:ee:23:0c  [root@Computer-5310-23 dhtools]#  [root@Computer-5310-23 vtu]# ifconfig enP2s7f0  enP2s7f0: flags=4163<UP,BROADCAST,RUNNING,MULTICAST> mtu 1500  inet6 fe80::2a7b:9ff:feee:230b prefixlen 64 scopeid 0x20<link>  ether 28:7b:09:ee:23:0b txqueuelen 1000 (Ethernet)  RX packets 0 bytes 0 (0.0 B)  RX errors 0 dropped 0 overruns 0 frame 0  TX packets 9 bytes 742 (742.0 B)  TX errors 0 dropped 0 overruns 0 carrier 0 collisions 0  [root@Computer-5310-23 vtu]# ifconfig enP2s7f1  enP2s7f1: flags=4163<UP,BROADCAST,RUNNING,MULTICAST> mtu 1500  inet6 fe80::2a7b:9ff:feee:230c prefixlen 64 scopeid 0x20<link>  ether 28:7b:09:ee:23:0c txqueuelen 1000 (Ethernet)  RX packets 0 bytes 0 (0.0 B)  RX errors 0 dropped 0 overruns 0 frame 0  TX packets 9 bytes 742 (742.0 B)  TX errors 0 dropped 0 overruns 0 carrier 0 collisions 0  [root@Computer-5310-23 vtu]# |

#### 序列号sn烧结指导

说明：

前置条件：正确获取fireware升级dhtool工具包（Dinghai项目制品库发布）

步骤

1. **上传对应操作系统类型的dhtool工具包到所在服务器操作系统，并切换到root操作。**
2. **查看E310/E312标卡当前的序列号sn（本文档以E312为例说明）**

|  |
| --- |
| [root@Computer-5310-23 dhtools]# lspci -vvs 0002:01:00.0  0002:01:00.0 Ethernet controller: ZTE Corporation NX E312 SRIOV PF Ethernet Controller (rev 01)  Subsystem: ZTE Corporation Device 549c  Physical Slot: 7  Control: I/O- Mem+ BusMaster+ SpecCycle- MemWINV- VGASnoop- ParErr+ Stepping- SERR+ FastB2B- DisINTx+  Status: Cap+ 66MHz- UDF- FastB2B- ParErr- DEVSEL=fast >TAbort- <TAbort- <MAbort- >SERR- <PERR- INTx-  Latency: 0  Interrupt: pin A routed to IRQ 182  NUMA node: 0  IOMMU group: 20  Region 0: Memory at 14037980000 (64-bit, prefetchable) [size=512K]  Region 4: Memory at 1402fa00000 (64-bit, prefetchable) [size=1M]  Expansion ROM at 68000000 [disabled] [size=128K]  Capabilities: [40] Power Management version 3  Flags: PMEClk- DSI- D1- D2- AuxCurrent=375mA PME(D0-,D1-,D2-,D3hot-,D3cold-)  Status: D0 NoSoftRst+ PME-Enable- DSel=0 DScale=0 PME-  Capabilities: [50] Vendor Specific Information: Len=10 <?>  Capabilities: [60] Vendor Specific Information: Len=10 <?>  Capabilities: [d8] Vendor Specific Information: Len=14 <?>  Capabilities: [c0] Vendor Specific Information: Len=10 <?>  Capabilities: [ec] Vendor Specific Information: Len=14 <?>  Capabilities: [70] Express (v2) Endpoint, MSI 00  DevCap: MaxPayload 512 bytes, PhantFunc 0, Latency L0s unlimited, L1 unlimited  ExtTag+ AttnBtn- AttnInd- PwrInd- RBE+ FLReset+ SlotPowerLimit 0.000W  DevCtl: CorrErr+ NonFatalErr+ FatalErr+ UnsupReq+  RlxdOrd+ ExtTag+ PhantFunc- AuxPwr- NoSnoop+ FLReset-  MaxPayload 512 bytes, MaxReadReq 4096 bytes  DevSta: CorrErr+ NonFatalErr- FatalErr- UnsupReq+ AuxPwr- TransPend-  LnkCap: Port #0, Speed 16GT/s, Width x16, ASPM L1, Exit Latency L1 <64us  ClockPM- Surprise- LLActRep- BwNot- ASPMOptComp+  LnkCtl: ASPM Disabled; RCB 64 bytes, Disabled- CommClk-  ExtSynch- ClockPM- AutWidDis- BWInt- AutBWInt-  LnkSta: Speed 16GT/s (ok), Width x16 (ok)  TrErr- Train- SlotClk+ DLActive- BWMgmt- ABWMgmt-  DevCap2: Completion Timeout: Range ABCD, TimeoutDis+ NROPrPrP- LTR+  10BitTagComp+ 10BitTagReq+ OBFF Via message, ExtFmt+ EETLPPrefix+, MaxEETLPPrefixes 2  EmergencyPowerReduction Not Supported, EmergencyPowerReductionInit-  FRS+ TPHComp+ ExtTPHComp-  AtomicOpsCap: 32bit+ 64bit+ 128bitCAS+  DevCtl2: Completion Timeout: 50us to 50ms, TimeoutDis- LTR- OBFF Disabled,  AtomicOpsCtl: ReqEn-  LnkCap2: Supported Link Speeds: 2.5-16GT/s, Crosslink+ Retimer+ 2Retimers+ DRS+  LnkCtl2: Target Link Speed: 16GT/s, EnterCompliance- SpeedDis-  Transmit Margin: Normal Operating Range, EnterModifiedCompliance- ComplianceSOS-  Compliance De-emphasis: -6dB  LnkSta2: Current De-emphasis Level: -6dB, EqualizationComplete+ EqualizationPhase1+  EqualizationPhase2+ EqualizationPhase3+ LinkEqualizationRequest-  Retimer- 2Retimers- CrosslinkRes: Upstream Port  Capabilities: [b0] MSI-X: Enable+ Count=128 Masked-  Vector table: BAR=4 offset=00008000  PBA: BAR=4 offset=0000c000  Capabilities: [d0] Vital Product Data  pcilib: sysfs\_read\_vpd: read failed: Input/output error  Not readable  Capabilities: [100 v2] Advanced Error Reporting  UESta: DLP- SDES- TLP- FCP- CmpltTO- CmpltAbrt- UnxCmplt- RxOF- MalfTLP- ECRC- UnsupReq- ACSViol-  UEMsk: DLP- SDES- TLP- FCP- CmpltTO- CmpltAbrt+ UnxCmplt- RxOF- MalfTLP- ECRC- UnsupReq+ ACSViol-  UESvrt: DLP+ SDES+ TLP- FCP+ CmpltTO- CmpltAbrt- UnxCmplt- RxOF+ MalfTLP+ ECRC- UnsupReq- ACSViol-  CESta: RxErr- BadTLP- BadDLLP- Rollover- Timeout- AdvNonFatalErr-  CEMsk: RxErr- BadTLP- BadDLLP- Rollover- Timeout- AdvNonFatalErr+  AERCap: First Error Pointer: 00, ECRCGenCap+ ECRCGenEn- ECRCChkCap+ ECRCChkEn-  MultHdrRecCap- MultHdrRecEn- TLPPfxPres- HdrLogCap-  HeaderLog: 00000000 00000000 00000000 00000000  Capabilities: [148 v1] Device Serial Number 00-00-00-00-00-00-00-00  Capabilities: [158 v1] Power Budgeting <?>  Capabilities: [168 v1] Alternative Routing-ID Interpretation (ARI)  ARICap: MFVC- ACS+, Next Function: 1  ARICtl: MFVC- ACS-, Function Group: 0  Capabilities: [178 v1] Secondary PCI Express  LnkCtl3: LnkEquIntrruptEn- PerformEqu-  LaneErrStat: 0  Capabilities: [1a8 v1] Physical Layer 16.0 GT/s <?>  Capabilities: [1d8 v1] Lane Margining at the Receiver <?>  Capabilities: [220 v1] Extended Capability ID 0x2a  Capabilities: [250 v1] Single Root I/O Virtualization (SR-IOV)  IOVCap: Migration-, Interrupt Message Number: 000  IOVCtl: Enable+ Migration- Interrupt- MSE+ ARIHierarchy+  IOVSta: Migration-  Initial VFs: 126, Total VFs: 126, Number of VFs: 32, Function Dependency Link: 00  VF offset: 8, stride: 8, Device ID: 8060  Supported Page Size: 00000553, System Page Size: 00000001  Region 0: Memory at 0000014033a80000 (64-bit, prefetchable)  Region 2: Memory at 0000014027c00000 (64-bit, prefetchable)  Region 4: Memory at 000001401fe00000 (64-bit, prefetchable)  VF Migration: offset: 00000000, BIR: 0  Capabilities: [290 v1] Transaction Processing Hints  Interrupt vector mode supported  Device specific mode supported  No steering table available  Capabilities: [2ac v1] Access Control Services  ACSCap: SrcValid- TransBlk- ReqRedir+ CmpltRedir+ UpstreamFwd- EgressCtrl+ DirectTrans+  ACSCtl: SrcValid- TransBlk- ReqRedir+ CmpltRedir+ UpstreamFwd- EgressCtrl- DirectTrans-  Capabilities: [2b8 v1] Page Request Interface (PRI)  PRICtl: Enable- Reset-  PRISta: RF- UPRGI- Stopped+  Page Request Capacity: 00000001, Page Request Allocation: 00000000  Capabilities: [2c8 v1] Latency Tolerance Reporting  Max snoop latency: 0ns  Max no snoop latency: 0ns  Capabilities: [2d0 v1] L1 PM Substates  L1SubCap: PCI-PM\_L1.2+ PCI-PM\_L1.1+ ASPM\_L1.2+ ASPM\_L1.1+ L1\_PM\_Substates+  PortCommonModeRestoreTime=10us PortTPowerOnTime=14us  L1SubCtl1: PCI-PM\_L1.2- PCI-PM\_L1.1- ASPM\_L1.2- ASPM\_L1.1-  T\_CommonMode=0us LTR1.2\_Threshold=0ns  L1SubCtl2: T\_PwrOn=10us  Capabilities: [2e0 v1] Process Address Space ID (PASID)  PASIDCap: Exec+ Priv+, Max PASID Width: 14  PASIDCtl: Enable+ Exec+ Priv+  Capabilities: [2e8 v1] Dynamic Power Allocation <?>  Capabilities: [36c v1] Readiness Time Reporting <?>  Capabilities: [378 v1] LN Requester <?>  Capabilities: [380 v1] Vendor Specific Information: ID=0002 Rev=4 Len=100 <?>  Capabilities: [480 v1] Vendor Specific Information: ID=0001 Rev=1 Len=038 <?>  Capabilities: [4b8 v1] Data Link Feature <?>  Capabilities: [4c4 v1] Precision Time Measurement  PTMCap: Requester:+ Responder:+ Root:+  PTMClockGranularity: 8ns  PTMControl: Enabled:- RootSelected:-  PTMEffectiveGranularity: Unknown  Capabilities: [4d0 v1] Vendor Specific Information: ID=0003 Rev=1 Len=054 <?>  Capabilities: [538 v1] Vendor Specific Information: ID=0006 Rev=0 Len=018 <?>  Kernel driver in use: zxdh\_pf  Kernel modules: zxdh\_pf  [root@Computer-5310-23 dhtools]#  #注：查出来Capabilities: [d0] Vital Product Data 段下可以查看到sn序列号，显示“Input/output error”没有烧结 |

1. **使用dhtool工具进行sn地址烧结**

|  |
| --- |
| [root@Computer-5310-23 dhtools]# ./dhtool eeupdate enP2s7f0 sn=201404110105  sn\_mac\_addr\_send\_info: [dhtool\_sn\_mac\_addr\_send][220] is called!  sn\_mac\_addr\_send\_info: [dhtool\_sn\_mac\_addr\_send\_msg][134] sn or mac addr send success.  [root@Computer-5310-23 dhtools]#  #注：文件名以实际安装包为准  #sn烧结期间期间建议停止所有服务器操作。 |

1. **掉电重启服务器**

注意并不是reboot，是power cycle，或者拔电源进行重启。

1. **服务器重启后，确认sn烧结成功**

|  |
| --- |
| [root@Computer-5310-23 vtu]# lspci -vvs 0002:01:00.0  0002:01:00.0 Ethernet controller: ZTE Corporation NX E312 SRIOV PF Ethernet Controller (rev 01)  Subsystem: ZTE Corporation Device 549c  Physical Slot: 7  Control: I/O- Mem+ BusMaster+ SpecCycle- MemWINV- VGASnoop- ParErr+ Stepping- SERR+ FastB2B- DisINTx+  Status: Cap+ 66MHz- UDF- FastB2B- ParErr- DEVSEL=fast >TAbort- <TAbort- <MAbort- >SERR- <PERR- INTx-  Latency: 0  Interrupt: pin A routed to IRQ 182  NUMA node: 0  IOMMU group: 23  Region 0: Memory at 14037980000 (64-bit, prefetchable) [size=512K]  Region 4: Memory at 1402fa00000 (64-bit, prefetchable) [size=1M]  Expansion ROM at 68000000 [disabled] [size=128K]  Capabilities: [40] Power Management version 3  Flags: PMEClk- DSI- D1- D2- AuxCurrent=375mA PME(D0-,D1-,D2-,D3hot-,D3cold-)  Status: D0 NoSoftRst+ PME-Enable- DSel=0 DScale=0 PME-  Capabilities: [50] Vendor Specific Information: Len=10 <?>  Capabilities: [60] Vendor Specific Information: Len=10 <?>  Capabilities: [d8] Vendor Specific Information: Len=14 <?>  Capabilities: [c0] Vendor Specific Information: Len=10 <?>  Capabilities: [ec] Vendor Specific Information: Len=14 <?>  Capabilities: [70] Express (v2) Endpoint, MSI 00  DevCap: MaxPayload 512 bytes, PhantFunc 0, Latency L0s unlimited, L1 unlimited  ExtTag+ AttnBtn- AttnInd- PwrInd- RBE+ FLReset+ SlotPowerLimit 0.000W  DevCtl: CorrErr+ NonFatalErr+ FatalErr+ UnsupReq+  RlxdOrd+ ExtTag+ PhantFunc- AuxPwr- NoSnoop+ FLReset-  MaxPayload 512 bytes, MaxReadReq 4096 bytes  DevSta: CorrErr+ NonFatalErr- FatalErr- UnsupReq+ AuxPwr- TransPend-  LnkCap: Port #0, Speed 16GT/s, Width x16, ASPM L1, Exit Latency L1 <64us  ClockPM- Surprise- LLActRep- BwNot- ASPMOptComp+  LnkCtl: ASPM Disabled; RCB 64 bytes, Disabled- CommClk-  ExtSynch- ClockPM- AutWidDis- BWInt- AutBWInt-  LnkSta: Speed 16GT/s (ok), Width x16 (ok)  TrErr- Train- SlotClk+ DLActive- BWMgmt- ABWMgmt-  DevCap2: Completion Timeout: Range ABCD, TimeoutDis+ NROPrPrP- LTR+  10BitTagComp+ 10BitTagReq+ OBFF Via message, ExtFmt+ EETLPPrefix+, MaxEETLPPrefixes 2  EmergencyPowerReduction Not Supported, EmergencyPowerReductionInit-  FRS+ TPHComp+ ExtTPHComp-  AtomicOpsCap: 32bit+ 64bit+ 128bitCAS+  DevCtl2: Completion Timeout: 50us to 50ms, TimeoutDis- LTR- OBFF Disabled,  AtomicOpsCtl: ReqEn-  LnkCap2: Supported Link Speeds: 2.5-16GT/s, Crosslink+ Retimer+ 2Retimers+ DRS+  LnkCtl2: Target Link Speed: 16GT/s, EnterCompliance- SpeedDis-  Transmit Margin: Normal Operating Range, EnterModifiedCompliance- ComplianceSOS-  Compliance De-emphasis: -6dB  LnkSta2: Current De-emphasis Level: -6dB, EqualizationComplete+ EqualizationPhase1+  EqualizationPhase2+ EqualizationPhase3+ LinkEqualizationRequest-  Retimer- 2Retimers- CrosslinkRes: Upstream Port  Capabilities: [b0] MSI-X: Enable+ Count=128 Masked-  Vector table: BAR=4 offset=00008000  PBA: BAR=4 offset=0000c000  Capabilities: [d0] Vital Product Data  Product Name: ZTE NX E312  Read-only fields:  [PN] Part number: NX E312  [SN] Serial number: 201404110105  [RV] Reserved: checksum good, 32 byte(s) reserved  Read/write fields:  [V0] Vendor specific: ZTE NX E312 2x100G NIC PCIe Gen4x16 Adapter  [V1] Vendor specific: Board ID 549C  End  Capabilities: [100 v2] Advanced Error Reporting  UESta: DLP- SDES- TLP- FCP- CmpltTO- CmpltAbrt- UnxCmplt- RxOF- MalfTLP- ECRC- UnsupReq- ACSViol-  UEMsk: DLP- SDES- TLP- FCP- CmpltTO- CmpltAbrt+ UnxCmplt- RxOF- MalfTLP- ECRC- UnsupReq+ ACSViol-  UESvrt: DLP+ SDES+ TLP- FCP+ CmpltTO- CmpltAbrt- UnxCmplt- RxOF+ MalfTLP+ ECRC- UnsupReq- ACSViol-  CESta: RxErr- BadTLP- BadDLLP- Rollover- Timeout- AdvNonFatalErr-  CEMsk: RxErr- BadTLP- BadDLLP- Rollover- Timeout- AdvNonFatalErr+  AERCap: First Error Pointer: 00, ECRCGenCap+ ECRCGenEn- ECRCChkCap+ ECRCChkEn-  MultHdrRecCap- MultHdrRecEn- TLPPfxPres- HdrLogCap-  HeaderLog: 00000000 00000000 00000000 00000000  Capabilities: [148 v1] Device Serial Number 00-00-00-00-00-00-00-00  Capabilities: [158 v1] Power Budgeting <?>  Capabilities: [168 v1] Alternative Routing-ID Interpretation (ARI)  ARICap: MFVC- ACS+, Next Function: 1  ARICtl: MFVC- ACS-, Function Group: 0  Capabilities: [178 v1] Secondary PCI Express  LnkCtl3: LnkEquIntrruptEn- PerformEqu-  LaneErrStat: 0  Capabilities: [1a8 v1] Physical Layer 16.0 GT/s <?>  Capabilities: [1d8 v1] Lane Margining at the Receiver <?>  Capabilities: [220 v1] Extended Capability ID 0x2a  Capabilities: [250 v1] Single Root I/O Virtualization (SR-IOV)  IOVCap: Migration-, Interrupt Message Number: 000  IOVCtl: Enable+ Migration- Interrupt- MSE+ ARIHierarchy+  IOVSta: Migration-  Initial VFs: 126, Total VFs: 126, Number of VFs: 32, Function Dependency Link: 00  VF offset: 8, stride: 8, Device ID: 8060  Supported Page Size: 00000553, System Page Size: 00000001  Region 0: Memory at 0000014033a80000 (64-bit, prefetchable)  Region 2: Memory at 0000014027c00000 (64-bit, prefetchable)  Region 4: Memory at 000001401fe00000 (64-bit, prefetchable)  VF Migration: offset: 00000000, BIR: 0  Capabilities: [290 v1] Transaction Processing Hints  Interrupt vector mode supported  Device specific mode supported  No steering table available  Capabilities: [2ac v1] Access Control Services  ACSCap: SrcValid- TransBlk- ReqRedir+ CmpltRedir+ UpstreamFwd- EgressCtrl+ DirectTrans+  ACSCtl: SrcValid- TransBlk- ReqRedir+ CmpltRedir+ UpstreamFwd- EgressCtrl- DirectTrans-  Capabilities: [2b8 v1] Page Request Interface (PRI)  PRICtl: Enable- Reset-  PRISta: RF- UPRGI- Stopped+  Page Request Capacity: 00000001, Page Request Allocation: 00000000  Capabilities: [2c8 v1] Latency Tolerance Reporting  Max snoop latency: 0ns  Max no snoop latency: 0ns  Capabilities: [2d0 v1] L1 PM Substates  L1SubCap: PCI-PM\_L1.2+ PCI-PM\_L1.1+ ASPM\_L1.2+ ASPM\_L1.1+ L1\_PM\_Substates+  PortCommonModeRestoreTime=10us PortTPowerOnTime=14us  L1SubCtl1: PCI-PM\_L1.2- PCI-PM\_L1.1- ASPM\_L1.2- ASPM\_L1.1-  T\_CommonMode=0us LTR1.2\_Threshold=0ns  L1SubCtl2: T\_PwrOn=10us  Capabilities: [2e0 v1] Process Address Space ID (PASID)  PASIDCap: Exec+ Priv+, Max PASID Width: 14  PASIDCtl: Enable+ Exec+ Priv+  Capabilities: [2e8 v1] Dynamic Power Allocation <?>  Capabilities: [36c v1] Readiness Time Reporting <?>  Capabilities: [378 v1] LN Requester <?>  Capabilities: [380 v1] Vendor Specific Information: ID=0002 Rev=4 Len=100 <?>  Capabilities: [480 v1] Vendor Specific Information: ID=0001 Rev=1 Len=038 <?>  Capabilities: [4b8 v1] Data Link Feature <?>  Capabilities: [4c4 v1] Precision Time Measurement  PTMCap: Requester:+ Responder:+ Root:+  PTMClockGranularity: 8ns  PTMControl: Enabled:- RootSelected:-  PTMEffectiveGranularity: Unknown  Capabilities: [4d0 v1] Vendor Specific Information: ID=0003 Rev=1 Len=054 <?>  Capabilities: [538 v1] Vendor Specific Information: ID=0006 Rev=0 Len=018 <?>  Kernel driver in use: zxdh\_pf  Kernel modules: zxdh\_pf  [root@Computer-5310-23 vtu]#  #注：查出来Capabilities: [d0] Vital Product Data 段下可以查看到sn序列号，显示和实际烧结的序列号相同。 |

## 异常处理

### 异常检测及自愈

#### 5.1.1 接口定义

XI410网卡提供DPDK接口，供OVS实现定时异常信息查询，如表5.1.1-1

|  |  |  |
| --- | --- | --- |
| 名称 | 内容 | 说明 |
| 接口函数 | int eth\_dev\_check （uint16\_t port\_id） | 实现智能网卡异常信息检测 |
| 参数 | uint16\_t port\_id | DPDK接管网卡PF1口的portid |
| 返回值 | 0 | 成功，网卡无异常 |
| 1 | 内存颗粒检测失败。 |
| 2 |  |

表5.1.1-1

#### 5.1.2 接口函数的定义文件

rte\_ethdev.h 增加 int eth\_dev\_check （uint16\_t port\_id；声明

rte\_ethdev.h 增加函数实现

#### 5.1.3 接口调用方式

1、ovs定时每秒一次调用eth\_dev\_check（port\_id）接口，该接口为dpdk新增接口；

2、eth\_dev\_check()接口根据返回值进行对应的操作，如果返回值为正值需要进行自愈操作。

3、自愈操作为重启ovs，通过ovs重启重新驱动智能网卡时对网卡进行reset操作。

### 故障信息收集

说明：

驱动提供以下接口函数用于智能网卡运维。Ovs可以封装此函数,用于智能网卡运维。该接口为dpdk开源已有接口。**临终遗言**等也通过一键采集接口输出。

#### 接口定义

见表5.2.1-1

|  |  |  |
| --- | --- | --- |
| 名称 | 内容 | 说明 |
| 接口函数 | rte\_flow\_dev\_dump | 打印网卡硬件信息到指定文件 |
| 参数 | uint16\_t port\_id | DPDK接管网卡PF1口的portid |
|  | struct rte\_flow \* flow | Flow指针，为NULL |
|  | FILE \* file | 打印输出文件路径 |
|  | struct rte\_flow\_error \*error | 错误信息，默认为null |
| 返回值 | 0为成功，否则为错误信息 | |

表5.2.1-1

#### 调试函数

* **ovs需要增加调试函数：**

|  |
| --- |
| Void ovs\_rte\_flow\_dev\_dump(struct unixctl\_conn \*conn,  int argc OVS\_UNUSED, const char \*argv[], void \*aux OVS\_UNUSED) |

* **调试函数注册调试命令ovs\_rte\_flow\_dev\_dump：**

|  |
| --- |
| cb("ovs\_rte\_flow\_dev\_dump", "ODP\_PORT FILE\_PATH", 2, 2, ovs\_rte\_flow\_dev\_dump, NULL); |

**注意：该调试命令只允许两个参数。**

* 参数1  port\_id  使用 rte\_eth\_dev\_is\_valid\_port判断有效性
* 参数2 输出文件名 如携带参数2，则将rte\_flow\_dev\_dump 接口的FILE文件输出到对应的文件中。

## BMC管理

说明：

待补充

步骤

待补充