

Linux Driver for the Pensando(R) Ethernet adapter family

Pensando Linux Ethernet driver. Copyright(c) 2019 Pensando Systems, Inc

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Identifying the Adapter

To find if one or more Pensando PCI Ethernet devices are installed on the host, check for the PCI devices:

```
$ lspci -d 1dd8:
b5:00.0 Ethernet controller: Device 1dd8:1002
b6:00.0 Ethernet controller: Device 1dd8:1002
```

If such devices are listed as above, then the ionic.ko driver should find and configure them for use. There should be log entries in the kernel messages such as these:

```
$ dmesg | grep ionic
ionic 0000:b5:00.0: 126.016 Gb/s available PCIe bandwidth (8.0 GT/s PCIe x16 link)
ionic 0000:b5:00.0 enp181s0: renamed from eth0
ionic 0000:b5:00.0 enp181s0: Link up - 100 Gbps
ionic 0000:b6:00.0: 126.016 Gb/s available PCIe bandwidth (8.0 GT/s PCIe x16 link)
ionic 0000:b6:00.0 enp182s0: renamed from eth0
ionic 0000:b6:00.0 enp182s0: Link up - 100 Gbps
```

Driver and firmware version information can be gathered with either of ethtool or devlink tools:

```
$ ethtool -i enp181s0
driver: ionic
version: 5.7.0
firmware-version: 1.8.0-28
...

$ devlink dev info pci/0000:b5:00.0
pci/0000:b5:00.0:
  driver ionic
  serial_number FLM18420073
  versions:
    fixed:
      asic.id 0x0
      asic.rev 0x0
    running:
      fw 1.8.0-28
```

See [Documentation/networking/devlink/ionic.rst](#) for more information on the devlink dev info data.

Enabling the driver

The driver is enabled via the standard kernel configuration system, using the make command:

```
make oldconfig/menuconfig/etc.
```

The driver is located in the menu structure at:

```
-> Device Drivers
    -> Network device support (NETDEVICES [=y])
        -> Ethernet driver support
            -> Pensando devices
                -> Pensando Ethernet IONIC Support
```

Configuring the Driver

MTU

Jumbo frame support is available with a maximum size of 9194 bytes.

Interrupt coalescing

Interrupt coalescing can be configured by changing the rx-usecs value with the "ethtool -C" command. The rx-usecs range is 0-190. The tx-usecs value reflects the rx-usecs value as they are tied together on the same interrupt.

SR-IOV

Minimal SR-IOV support is currently offered and can be enabled by setting the sysfs 'sriov_numvfs' value, if supported by your particular firmware configuration.

Statistics

Basic hardware stats

The commands `netstat -i`, `ip -s link show`, and `ifconfig` show a limited set of statistics taken directly from firmware. For example:

```
$ ip -s link show enp181s0
7: enp181s0: <BROADCAST,MULTICAST,UP,LOWER_UP> mtu 1500 qdisc mq state UP mode DEFAULT group default qlen 1000
    link/ether 00:ae:cd:00:07:68 brd ff:ff:ff:ff:ff:ff
    RX: bytes    packets  errors  dropped overrun mcast
      414         5        0       0        0       0
    TX: bytes    packets  errors  dropped carrier collsns
      1384       18        0       0        0       0
```

ethtool -S

The statistics shown from the `ethtool -S` command includes a combination of driver counters and firmware counters, including port and queue specific values. The driver values are counters computed by the driver, and the firmware values are gathered by the firmware from the port hardware and passed through the driver with no further interpretation.

Driver port specific:

```
tx_packets: 12
tx_bytes: 964
rx_packets: 5
rx_bytes: 414
tx_tso: 0
tx_tso_bytes: 0
tx_csum_none: 12
tx_csum: 0
rx_csum_none: 0
rx_csum_complete: 3
rx_csum_error: 0
```

Driver queue specific:

```
tx_0_pkts: 3
tx_0_bytes: 294
tx_0_clean: 3
tx_0_dma_map_err: 0
tx_0_linearize: 0
tx_0_frags: 0
tx_0_tso: 0
tx_0_tso_bytes: 0
tx_0_csum_none: 3
tx_0_csum: 0
tx_0_vlan_inserted: 0
rx_0_pkts: 2
rx_0_bytes: 120
rx_0_dma_map_err: 0
rx_0_alloc_err: 0
rx_0_csum_none: 0
rx_0_csum_complete: 0
rx_0_csum_error: 0
rx_0_dropped: 0
rx_0_vlan_stripped: 0
```

Firmware port specific:

```
hw_tx_dropped: 0
hw_rx_dropped: 0
hw_rx_over_errors: 0
hw_rx_missed_errors: 0
hw_tx_aborted_errors: 0
frames_rx_ok: 15
frames_rx_all: 15
frames_rx_bad_fcs: 0
frames_rx_bad_all: 0
octets_rx_ok: 1290
octets_rx_all: 1290
frames_rx_unicast: 10
frames_rx_multicast: 5
```

```
frames_rx_broadcast: 0
frames_rx_pause: 0
frames_rx_bad_length: 0
frames_rx_undersized: 0
frames_rx_oversized: 0
frames_rx_fragments: 0
frames_rx_jabber: 0
frames_rx_pripause: 0
frames_rx_stomped_crc: 0
frames_rx_too_long: 0
frames_rx_vlan_good: 3
frames_rx_dropped: 0
frames_rx_less_than_64b: 0
frames_rx_64b: 4
frames_rx_65b_127b: 11
frames_rx_128b_255b: 0
frames_rx_256b_511b: 0
frames_rx_512b_1023b: 0
frames_rx_1024b_1518b: 0
frames_rx_1519b_2047b: 0
frames_rx_2048b_4095b: 0
frames_rx_4096b_8191b: 0
frames_rx_8192b_9215b: 0
frames_rx_other: 0
frames_tx_ok: 31
frames_tx_all: 31
frames_tx_bad: 0
octets_tx_ok: 2614
octets_tx_total: 2614
frames_tx_unicast: 8
frames_tx_multicast: 21
frames_tx_broadcast: 2
frames_tx_pause: 0
frames_tx_pripause: 0
frames_tx_vlan: 0
frames_tx_less_than_64b: 0
frames_tx_64b: 4
frames_tx_65b_127b: 27
frames_tx_128b_255b: 0
frames_tx_256b_511b: 0
frames_tx_512b_1023b: 0
frames_tx_1024b_1518b: 0
frames_tx_1519b_2047b: 0
frames_tx_2048b_4095b: 0
frames_tx_4096b_8191b: 0
frames_tx_8192b_9215b: 0
frames_tx_other: 0
frames_tx_pri_0: 0
frames_tx_pri_1: 0
frames_tx_pri_2: 0
frames_tx_pri_3: 0
frames_tx_pri_4: 0
frames_tx_pri_5: 0
frames_tx_pri_6: 0
frames_tx_pri_7: 0
frames_rx_pri_0: 0
frames_rx_pri_1: 0
frames_rx_pri_2: 0
frames_rx_pri_3: 0
frames_rx_pri_4: 0
frames_rx_pri_5: 0
frames_rx_pri_6: 0
frames_rx_pri_7: 0
tx_pripause_0_lus_count: 0
tx_pripause_1_lus_count: 0
tx_pripause_2_lus_count: 0
tx_pripause_3_lus_count: 0
tx_pripause_4_lus_count: 0
tx_pripause_5_lus_count: 0
tx_pripause_6_lus_count: 0
tx_pripause_7_lus_count: 0
rx_pripause_0_lus_count: 0
rx_pripause_1_lus_count: 0
rx_pripause_2_lus_count: 0
rx_pripause_3_lus_count: 0
rx_pripause_4_lus_count: 0
rx_pripause_5_lus_count: 0
rx_pripause_6_lus_count: 0
rx_pripause_7_lus_count: 0
rx_pause_lus_count: 0
frames_tx_truncated: 0
```

Support

For general Linux networking support, please use the netdev mailing list, which is monitored by Pensando personnel:

`netdev@vger.kernel.org`

For more specific support needs, please use the Pensando driver support email:

`drivers@pensando.io`