Perception Development Kit Knowledge Base

October 22, 2018

Version 1.0

Table of Revisions

Version	Date	Author	Description
1.0	Sep 2018	Schlitz, Rieker	Initial Version

Contact

销售经理 张刘虎：
156 5199 5902
< liuhu.zhang@hurys.com >

产品总监 陶征：
136 0158 5984
< zheng.tao@hurys.com >

技术工程师 李闪：
176 2604 2287
< shan.li@hurys.com >

Glossary

Abbreviation	Description
IP	Internet Protocol
PDK	Perception Development Kit
PTP	Precision Time Protocol
PTPd	Precision Time Protocol daemon
RDI	RADAR Detection Image
ROS	Robot Operating System
VLAN	Virtual Local Area Network

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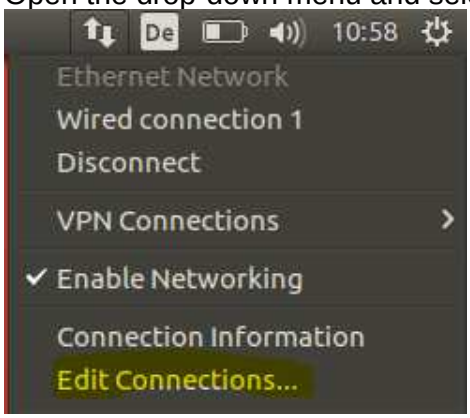
1 PDK network configuration

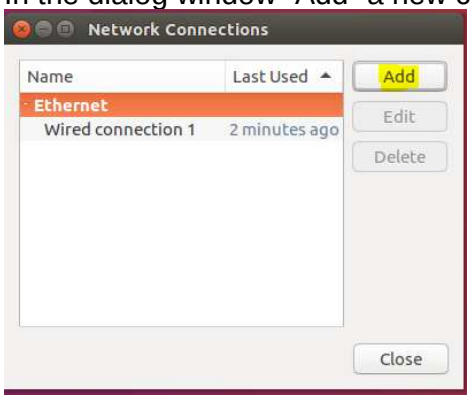
1.1 Persistent configuration using Network Manager

In Ubuntu 16.04. the network configuration for the radar sensors can be done using the network manager from the top bar.

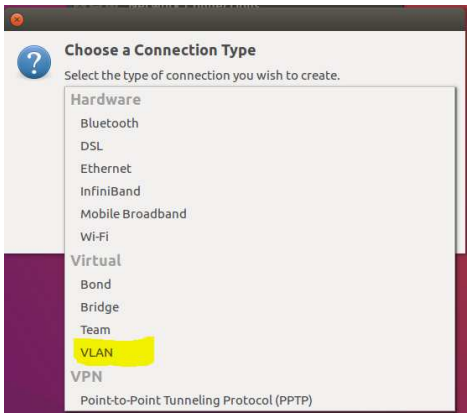
Open the drop-down menu and select “Edit connections”:



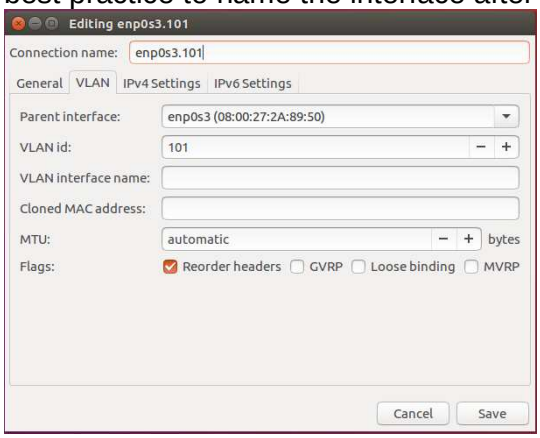
In the dialog window “Add” a new connection:



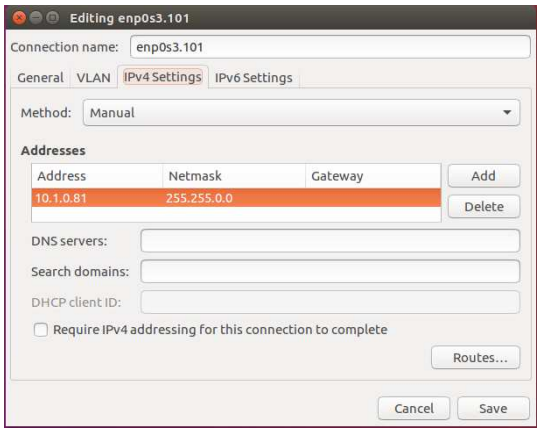
Select “VLAN” as the connection type:



In the dialog window you need to select the parent interface (the physical interface you connected the MediaGateway to), enter the VLAN ID (101) and name the interface. It is best practice to name the interface after the parent interface followed by the VLAN ID:



In the “IPv4 Settings” tab you need to switch the method to “Manual” and enter the correct IP settings:



The route for libeCAL can not be configured with Network Manager and has to be added differently, see the other chapters.

1.2 Persistent configuration using *interfaces*

For systems not using Network Manager or that are not configured by UI the settings for the VLAN can be added to the */etc/network/interfaces.*

```
auto enp0s25 # The parent interface
iface enp0s25 inet static
  address 192.168.1.26
  netmask 255.255.255.0

auto enp0s25.101 # The VLAN interface
iface enp0s25.101 inet static
  vlan-raw-device enp0s25
  address 10.1.0.81
  netmask 255.255.0.0
```

The route for libeCAL can be added to the loopback device:

```
auto lo
iface lo inet loopback
  post-up route add -net 239.0.0.0 netmask 255.0.0.0 dev lo
```

1.3 Configuration using *ip*

For a configuration that is not persistant the command line can be used.

Install the vlan package:
```
$ sudo apt install vlan
```

Load the current Kernel module:
```
$ sudo modprobe 8021q
```

Add the VLAN interface
```
$ sudo vconfig add enp0s25 101
Added VLAN with VID == 101 to IF -:enp0s25:-
```

Set the IP address for the new interface
```
$ sudo ip addr add 10.1.0.81/16 dev enp0s25.101
```

Bring up the interface
```
$ sudo ip link set enp0s25.101 up
```

2 PTPd Setup on Ubuntu 16.04

The following steps are necessary to enable PTP (Precision Time Protocol) synchronization on Ubuntu 16.04

1) Install the ptpd package. This can usually be done by “apt install ptpd”

```
# apt install ptpd
Reading package lists... Done
Building dependency tree
Reading state information... Done
ptpd is already the newest version (2.3.1-debian1-1).
0 upgraded, 0 newly installed, 0 to remove and 0 not upgraded.
```

2) Edit /etc/default/ptpd, enable the daemon and add the configuration file.

```
# cat /etc/default/ptpd
# /etc/default/ptpd

# Set to "yes" to actually start ptpd automatically
START_DAEMON=yes

# Add command line options for ptpd
PTPD_OPTS="-c /etc/ptpd2.conf"
```

3) Edit the configuration file for ptpd. You might need to change the interface to match your configuration.

```
# cat /etc/ptpd2.conf
; RADAR dev kit configuration
[ptpengine]
interface = eno1.101
transport = ethernet
preset = masteronly
delay_mechanism = E2E
disable_bmca = y
```

4) Check if the configuration file can be parsed successfully.

```
# ptpd -k -c /etc/ptpd2.conf
Configuration OK
```

5) Start the service and check the status

```
# service ptpd start
```

```
# service ptpd status
● ptpd.service - LSB: start and stop ptpd
   Loaded: loaded (/etc/init.d/ptpd; bad; vendor preset: enabled)
   Active: active (running) since Mo 2018-07-09 12:54:37 CEST; 23min ago
     Docs: man:systemd-sysv-generator(8)
   CGroup: /system.slice/ptpd.service
           └─11973 /usr/sbin/ptpd -c /etc/ptpd2.conf
```

6) To check if the sensor receives the messages
    a. Check the current system timestamp:

```
$ date +%s
```

    b. Check the timestamp in the monitoring tool, it should match the system timestamp.
    c. Power cycle the sensor. It will jump back to the system timestamp after a short delay of about a second.

3 Frequently Asked Questions

Q: Do sensors synchronize to interleave sampling so they don't emit at the same time or does it not matter?

A: sensors do not synchronize their samplings. This is not required, because it is very unlikely that they interfere and even if they do it would be just for one cycle, because the sampling is randomized. The sensor is automotive graded and the sensor frontend is already in series production. So, it is quite a common use cases that Conti radars in different vehicles operate without interference when the vehicles are approaching each other or driving in parallel.

Q: The PTP daemon is running, the interface is correct but none of the sensors show the system timestamp

A: This might be an issue with VLAN handling in certain network adapters. The behavior can be changed with *ethtool*. Make sure you use the same interface you use for PTP and execute the following commands:

```
# ethtool -K <interface> txvlan off
# ethtool -K <interface> rxvlan off
```