How to use enc28j60 network interface card as a GPIO NIC

ENC28J60 card is supported by official Raspberry Pi system which works mainly for Raspberry Pi Zero, you can buy this module on ebay although we do not offer this module in the application kit.

Wire Connection：

1, Modify the configuration of config.txt

2, Download and install python-pip and speedtest-cli

3, Test network speed

Wiring Manual:

int -----GPIO21

3.3v ----- 3.3v

GND-----GND

MOSI-----MOSI

MISO-----MISO

SCLK-----SCLK

CS ----- CE0

Modify the configuration:

sudo vim.tiny /boot/config.txt

Type in:

dtparam = spi = on

dtoverlay = enc28j60, int_pin = 21, speed = 1000000

Restart Raspberry Pi and login in. You can see that spi0.0 has loaded Ethernet driver through dmesg |grep enc28j60 and there is one more network card eth1 with an IP address through **ifconfig**

```
pi@raspberrypi:~ $ dmesg |grep enc28j60
[    5.509761] enc28j60 spi0.0: enc28j60 Ethernet driver 1.01 loaded
[    5.526871] net eth1: enc28j60 driver registered
pi@raspberrypi:~ $ ifconfig
eth0      Link encap:Ethernet  HWaddr b8:27:eb:33:85:0b
          inet6 addr: fe80::4709:5652:329f:f1ff/64 Scope:Link
          UP BROADCAST MULTICAST  MTU:1500  Metric:1
          RX packets:0 errors:0 dropped:0 overruns:0 frame:0
          TX packets:0 errors:0 dropped:0 overruns:0 carrier:0
          collisions:0 txqueuelen:1000
          RX bytes:0 (0.0 B)  TX bytes:0 (0.0 B)

eth1      Link encap:Ethernet  HWaddr 3e:4a:23:4b:54:10
          inet addr:192.168.3.43  Bcast:192.168.3.255  Mask:255.255.255.0
          inet6 addr: fe80::c86a:471e:7b26:61cf/64 Scope:Link
          UP BROADCAST RUNNING MULTICAST  MTU:1500  Metric:1
          RX packets:424 errors:0 dropped:56 overruns:0 frame:0
          TX packets:240 errors:0 dropped:0 overruns:0 carrier:0
          collisions:0 txqueuelen:1000
          RX bytes:42170 (41.1 KiB)  TX bytes:32592 (31.8 KiB)
          Interrupt:245

lo        Link encap:Local Loopback
          inet addr:127.0.0.1  Mask:255.0.0.0
          inet6 addr: ::1/128 Scope:Host
          UP LOOPBACK RUNNING  MTU:65536  Metric:1
          RX packets:136 errors:0 dropped:0 overruns:0 frame:0
          TX packets:136 errors:0 dropped:0 overruns:0 carrier:0
          collisions:0 txqueuelen:0
          RX bytes:11472 (11.2 KiB)  TX bytes:11472 (11.2 KiB)

wlan0     Link encap:Ethernet  HWaddr e8:4e:06:0e:1f:d9
          inet addr:192.168.3.42  Bcast:192.168.3.255  Mask:255.255.255.0
          inet6 addr: fe80::5aaa:b8b5:28e7:4bfc/64 Scope:Link
          UP BROADCAST RUNNING MULTICAST  MTU:1500  Metric:1
          RX packets:235 errors:0 dropped:37 overruns:0 frame:0
          TX packets:98 errors:0 dropped:1 overruns:0 carrier:0
          collisions:0 txqueuelen:1000
          RX bytes:33663 (32.8 KiB)  TX bytes:14287 (13.9 KiB)

pi@raspberrypi:~ $ sp
speaker-test   speedtest      speedtest-cli  splain         split          splitfont      sprof
pi@raspberrypi:~ $ sp
speaker-test   speedtest      speedtest-cli  splain         split          splitfont      sprof
pi@raspberrypi:~ $ speedtest-cli
Retrieving speedtest.net configuration...
Retrieving speedtest.net server list...
Testing from China Unicom Shanghai network (27.115.71.122)...
Selecting best server based on latency...
Hosted by Shanghai Branch, China Unicom (Shanghai) [19.64 km]: 13.971 ms
Testing download speed.....................................
Download: 0.76 Mbit/s
Testing upload speed.....................................................
Upload: 0.74 Mbit/s
```

Then run this command to finish the installation:

sudo apt-get update && sudo apt-get install -y python-pip && sudo easy_install speedtest-cli

When the installation is finished. Run the command and you will see the test result like shown above. As I adjust the speed to 1000000, the speed shows only 0.76Mbit/s. Edit the speed parameters and you will see the following result:

```
pi@raspberrypi:~ $ lsusb
Bus 001 Device 004: ID 0bda:8176 Realtek Semiconductor Corp. RTL8188CUS 802.11n WLAN Adapter
Bus 001 Device 003: ID 0424:ec00 Standard Microsystems Corp. SMSC9512/9514 Fast Ethernet Adapter
Bus 001 Device 002: ID 0424:9514 Standard Microsystems Corp.
Bus 001 Device 001: ID 1d6b:0002 Linux Foundation 2.0 root hub
pi@raspberrypi:~ $
pi@raspberrypi:~ $ dmesg |grep enc
[    0.001537] Calibrating delay loop (skipped), value calculated using timer frequency.. 38.40 BogoMIPS (lpj=192000)
[    0.003698] CPU: Testing write buffer coherency: ok
[    5.386389] enc28j60 spi0.0: enc28j60 Ethernet driver 1.01 loaded
[    5.396014] net eth1: enc28j60 driver registered
pi@raspberrypi:~ $
pi@raspberrypi:~ $
pi@raspberrypi:~ $ grep -v "#" /boot/config.txt |grep -v "^$"
 For more options and information see
dtoverlay=enc28j60,int_pin=21,speed=12000000
dtparam=audio=on
start_x=1
gpu_mem=128
dtparam=spi=on
dtparam=i2c_arm=on
device_tree=bcm2709-rpi-2-b.dtb
pi@raspberrypi:~ $ speedtest-cli
Retrieving speedtest.net configuration...
Retrieving speedtest.net server list...
Testing from China Unicom Shanghai network (27.115.71.122)...
Selecting best server based on latency...
Hosted by Shanghai Branch, China Unicom (Shanghai) [19.64 km]: 10.567 ms
Testing download speed.....................................
Download: 5.85 Mbit/s
Testing upload speed.......................................................
Upload: 3.68 Mbit/s
pi@raspberrypi:~ $
```

There is a Spi speedometer on Raspberry Pi official website. Test it one by one:

My friend told me that 125.0 and 62.5MHZ does not work fine. So I will try it with 15.6HMZ, it is better now. You may try it by yourself. Feel free to let me know if you have any question.