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FIBOCOM Linux_QMI_WWAN User Guide

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Applicability type

No.	Product model	Description
1	NL668 Series	NA

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Versions

Version	Author	Assessor	Approver	Update Date	Description
V1.0.0	Wang Bingtao	Long Yiliang	Cheng Kai	2019-10-10	Initial verison.

Contents

1 QMI WWAN Overview

This paper describes the driver integration and dialing method related to QMI_WWAN dialing of NL668 series wireless communication module. Linux 3.4 and higher supports the QMI_WWAN driver by default. In the actual application process, the QMI_WWAN driver needs to be modified. That is, the Module (module) VID/PID is added so that Linux can automatically adapt to drive the NL668 module. When the module is attached to QMI WWAN driver, the driver will create a network device and a QMI channel. The network device is named as *wwanX*, and QMI channel is named as */dev/cdc-wdmX*. The network device is used for data transmission, and QMI channel is used for QMI message interaction.

2 Mode and related compositions

mode	list of supported <mode>
17	Diag+Modem+AT+Pipe+RMNET+ADB
18	Diag+Modem+AT+Pipe+ECM+ADB
19	Diag+Modem+Pipe+RMNET
20	Modem
21	Modem+AT
22	Modem+AT+RMNET
23	Modem+AT+ECM
24	RNDIS+Modem+Diag+ADB
25	Diag+Modem+AT+Pipe+RMNET
26	Diag+Modem+AT+Pipe+ECM

NOTE:QMI_WWAN dialing requires the use of RMNET port, as long as the enumerated port contains RMNET port, you can use QMI_WWAN dialing.

3 Set USB Configuration Profile

AT+GTUSBMODE? Query USB Configuration Profile.

```
AT+GTUSBMODE?
+GTUSBMODE: 17
OK
```

If the return value is not 17 or 19 or 22 or 25, it means that the module does not enter RMNET, you need to send AT+GTUSBMODE=x (x is 17 or 19 or 22 or 25) successfully, and restart the module to switch the module to RMNET mode.

4 QMI_WWAN driver

4.1 QMI_WWAN driver integration

The qmi wwan driver requires the kernel's usbnet driver support, so you need to configure the Linux kernel. The configuration method is as follows:

```
cd kernel
make menuconfig
```

device drivers->Network device support->usb Network Adapters

Select the following components:

Multi-purpose USB Networking Framework

Save the configuration after selected it, recompile the kernel.

4.2 Build

4.2.1.1 Build and Load Driver as a Kernel Module

1、 Download the corresponding version of the kernel source;

2、 Unzip the downloaded kernel source;

3、 Change directory to kernel source directory;

4、 `make -C /lib/modules/`uname -a`/build M=`pwd`/drivers/net/usb obj-m=qmi_wwan.o modules`

5、 `cp drivers/net/usb/qmi_wwan.ko /lib/modules/`uname -a`/kernel/drivers/net/usb/`

6、 `depmod`

4.2.1.2 Build into the kernel

1、 Enable CONFIG_USB_NET_QMI_WWAN、Enable CONFIG_USB_SERIAL_OPTION

Modify the .config file in the root directory of the kernel source, modify it in .config

```
CONFIG_USB_NET_QMI_WWAN=y,CONFIG_USB_SERIAL_OPTION=y
```

4.3 Modify Driver Source Code

4.3.1.1 ADD VID/PID

FILE: ./drivers/net/usb/qmi_wwan.c

```
static const struct usb_device_id products[] = {
…..
```

```
    /* 3. Combined interface devices matching on interface number */
    {QMI_FIXED_INTF(0x0408, 0xea42, 4)},       /* Yota / Megafon M100-1 */
    {QMI_FIXED_INTF(0x05c6, 0x6001, 3)},/* 4G LTE usb-modem U901 */
    {QMI_FIXED_INTF(0x05c6, 0x7000, 0)},
    {QMI_FIXED_INTF(0x05c6, 0x7001, 1)},
    {QMI_FIXED_INTF(0x1508, 0x1001, 4)}, //add for fibocom NL668 vid:0x1508 pid:0x1001
…..
```

4.3.1.2 Store device id so we can use it during attach

FILE: ./drivers/usb/serial/option.c

```
static int option_probe(struct usb_serial *serial,
            const struct usb_device_id *id)
{
………
     * Don't bind network interface on Samsung GT-B3730, it is handled by
     * a separate module.
     */
    if (dev_desc->idVendor == cpu_to_le16(SAMSUNG_VENDOR_ID) &&
        dev_desc->idProduct == cpu_to_le16(SAMSUNG_PRODUCT_GT_B3730) &&
        iface_desc->bInterfaceClass != USB_CLASS_CDC_DATA)
        return -ENODEV;
    /* Store device id so we can use it during attach. */
    if (dev_desc->idVendor == cpu_to_le16(0x1508) &&
        dev_desc->idProduct == cpu_to_le16(0x1001) &&
        iface_desc->bInterfaceNumber >= 4)
        return -ENODEV;
    usb_set_serial_data(serial, (void *)id);
    return 0;
}
```

4.3.1.3 Add Support for Raw IP Mode

FILE: ./drivers/net/usb/qmi_wwan.c

```
#define FIBOCOM_QMI_WWAN_RAWIP
#ifdef FIBOCOM_QMI_WWAN_RAWIP
#include <linux/etherdevice.h>
```

```
struct sk_buff *qmi_wwan_tx_fixup(struct usbnet *dev, struct sk_buff *skb,gfp_t flags)
{
    if (dev->udev->descriptor.idVendor !=cpu_to_le16(0x1508))
        return skb;
    // Skip Ethernet header from message
    if (skb_pull(skb, ETH_HLEN)) {
        return skb;
    } else {
        dev_err(&dev->intf->dev, "Packet Dropped");
    }
    // Filter the packet out, release it
        dev_kfree_skb_any(skb);
    return NULL;
}
#endif
static int qmi_wwan_bind(struct usbnet *dev, struct usb_interface *intf)
{
    int status = -1;
    u8 *buf = intf->cur_altsetting->extra;
    int len = intf->cur_altsetting->extralen;
    struct usb_interface_descriptor *desc = &intf->cur_altsetting->desc;
    struct usb_cdc_union_desc *cdc_union = NULL;
….
#ifdef   FIBOCOM_QMI_WWAN_RAWIP
    if(dev->udev->descriptor.idVendor == cpu_to_le16(0x1508)) {
        dev_info(&intf->dev, "Fibocom nl668 work on RawIP mode\n");
        dev->net->flags |= IFF_NOARP;
        usb_control_msg(
        interface_to_usbdev(intf),
        usb_sndctrlpipe(interface_to_usbdev(intf), 0),
            0x22,//USB_CDC_REQ_SET_CONTROL_LINE_STATE
            0x21,//USB_DIR_OUT | USB_TYPE_CLASS | USB_RECIP_INTERFACE
            1, //active CDCDTR
            intf->cur_altsetting->desc.bInterfaceNumber,
                    NULL, 0, 100);
        }
#endif
err:
        return status;
}
static const struct driver_info     qmi_wwan_info = {
        .description    = "WWAN/QMI device",
        .flags              = FLAG_WWAN,
        .bind               = qmi_wwan_bind,
        .unbind             = qmi_wwan_unbind,
        .manage_power   = qmi_wwan_manage_power,
        .rx_fixup             = qmi_wwan_rx_fixup,
#ifdef FIBOCOM_QMI_WWAN_RAWIP
        .tx_fixup             = qmi_wwan_tx_fixup,
#endif
};
```

Note: The code on the gray background is the original code, and there is no gray background to indicate the code that needs to be added.

4.4 View network interface information

Use the ifconfig command to view the NIC information. If wwan0 is displayed, the driver is successfully loaded. Here, the wwan0 driver is successfully loaded.

```
wwan0       Link encap:Ethernet    HWaddr a2:a3:74:f9:bc:1b
            inet addr:10.100.76.173    Bcast:10.100.76.175    Mask:255.255.255.252
            inet6 addr: fe80::a0a3:74ff:fef9:bc1b/64 Scope:Link
            UP BROADCAST RUNNING NOARP MULTICAST    MTU:1500    Metric:1
            RX packets:2985 errors:0 dropped:0 overruns:0 frame:0
            TX packets:3067 errors:0 dropped:0 overruns:0 carrier:0
            collisions:0 txqueuelen:1000
            RX bytes:251259 (251.2 KB)    TX bytes:261282 (261.2 KB)
```

5 Build of QMI_WWAN application

Application fibocom_qmi.

code： fibocom_qmi.tar.bz2

5.1 Build fibocom_qmi

1、 upzip fibocom_qmi.tar.bz2

2、 cd fibocom_qmi/

3、 make

6 TEST QMI WWAN

6.1 Application instructions

```
Usage: ./fibocom_qmi [-s [apn [user password auth]]] [-p pincode] [-f logfilename] [-6]
  -s [apn [user password auth]] Set apn/user/password/auth get from your network provider
  -p pincode                     Verify sim card pin if sim card is locked
  -f logfilename                Save log message of this program to file
  -auth                          0 ~ None, 1 ~ Pap, 2 ~ Chap, 3 ~ MsChapV2
  -6                             support ipv4&ipv6;default support ipv4
```

Example 1: ./fibocom_qmi

Example 2: ./fibocom_qmi -s 3gnet

Example 3: ./fibocom_qmi -s 3gnet carl 1234 0 -p 1234 -f gobinet_log.txt

Example 4: ./fibocom_qmi -6 network will be configured with both IPv4 and IPv6 connectivity capabilities.

6.2 Disconnetct the Dial-up Connection

```
killall fibocom_qmi
```

6.3 Access to the network

Enter the ping www.baidu.com command to test whether you can ping the website; or open a browser to test the Internet.