USB线连接EC20后，出现了ttyS0~ttyS4，情况如下：

```
[root@Board:/dev]# usb 1-3: new high-speed USB device number 2 using atmel-ehci
usb 1-3: New USB device found, idVendor=05c6, idProduct=9215
usb 1-3: New USB device strings: Mfr=1, Product=2, SerialNumber=0
usb 1-3: Product: Quectel LTE Module
usb 1-3: Manufacturer: Quectel
option 1-3:1.0: GSM modem (1-port) converter detected
usb 1-3: GSM modem (1-port) converter now attached to ttyUSB0
option 1-3:1.1: GSM modem (1-port) converter detected
usb 1-3: GSM modem (1-port) converter now attached to ttyUSB1
option 1-3:1.2: GSM modem (1-port) converter detected
usb 1-3: GSM modem (1-port) converter now attached to ttyUSB2
option 1-3:1.3: GSM modem (1-port) converter detected
usb 1-3: GSM modem (1-port) converter now attached to ttyUSB3
```

```
[root@Board:/dev]# ls
loop3           ptyp1           tty36           ttyUSB0
loop4           ptyp2           tty37           ttyUSB1
loop5           ptyp3           tty38           ttyUSB2
loop6           ram0            tty39           ttyUSB3
```

拔掉时，情况如下：

```
[root@Board:/dev]# rebootusb 1-3: USB disconnect, device number 2
option1 ttyUSB0: GSM modem (1-port) converter now disconnected from ttyUSB0
option 1-3:1.0: device disconnected
option1 ttyUSB1: GSM modem (1-port) converter now disconnected from ttyUSB1
option 1-3:1.1: device disconnected
option1 ttyUSB2: GSM modem (1-port) converter now disconnected from ttyUSB2
option 1-3:1.2: device disconnected
option1 ttyUSB3: GSM modem (1-port) converter now disconnected from ttyUSB3
option 1-3:1.3: device disconnected
```

测试电源，把电源的使能脚PE10拉高：

```
[root@Board:/]# cd sys/class/gpio/
[root@Board:/sys/class/gpio]# ls
```

```
export      gpiochip128  gpiochip64   unexport
gpiochip0   gpiochip32   gpiochip96
[root@Board:/sys/class/gpio]# echo 138 > export
[root@Board:/sys/class/gpio]# ls
export      gpiochip128  gpiochip64   pioE10
gpiochip0   gpiochip32   gpiochip96   unexport
[root@Board:/sys/class/gpio]# echo out > pioE10/direction
[root@Board:/sys/class/gpio]# echo 1 > pioE10/value
```

上面的步骤后，PE10已经是高电平了，也发现4G模块的电源灯亮起来了。

然后发现已经找到EC20了：

```
[root@Board:/sys/class/gpio]# usb 1-1: new high-speed USB device number 2 using
atmel-ehci
usb 1-1: New USB device found, idVendor=05c6, idProduct=9215
usb 1-1: New USB device strings: Mfr=1, Product=2, SerialNumber=0
usb 1-1: Product: Quectel LTE Module
usb 1-1: Manufacturer: Quectel
option 1-1:1.0: GSM modem (1-port) converter detected
usb 1-1: GSM modem (1-port) converter now attached to ttyUSB0
option 1-1:1.1: GSM modem (1-port) converter detected
usb 1-1: GSM modem (1-port) converter now attached to ttyUSB1
option 1-1:1.2: GSM modem (1-port) converter detected
usb 1-1: GSM modem (1-port) converter now attached to ttyUSB2
option 1-1:1.3: GSM modem (1-port) converter detected
usb 1-1: GSM modem (1-port) converter now attached to ttyUSB3
usb 1-1: USB disconnect, device number 2
option1 ttyUSB0: GSM modem (1-port) converter now disconnected from ttyUSB0
option 1-1:1.0: device disconnected
option1 ttyUSB1: GSM modem (1-port) converter now disconnected from ttyUSB1
option 1-1:1.1: device disconnected
option1 ttyUSB2: GSM modem (1-port) converter now disconnected from ttyUSB2
option 1-1:1.2: device disconnected
option1 ttyUSB3: GSM modem (1-port) converter now disconnected from ttyUSB3
option 1-1:1.3: device disconnected

[root@Board:/sys/class/gpio]#
```

为什么又会自动disconnected呢，看原理图，觉得可能是因为PE3的原因，把PE3拉低再拉高，然后的确就不会再disconnected了。PE3是让EC20复位一下。

根据移远的手册，ttyUSB2是针对AT指令的，向 /dev/ttyUSB2 发 echo AT >

/dev/ttyUSB2，stty -F /dev/ttyUSB2，发现波特率改为了 115200。

在Linux命令中 echo -e 这个参数e是允许后面的输出进行转义。
假设你是 echo -e "i will use \n $HOME" 输出的将是：
i will use
/root
如果是 echo "i will use \n $HOME" 则输出是：
i will use \n $HOME

```
root@ARM40:~# echo -e "i will use \n $HOME"
i will use
 /root
root@ARM40:~# echo "i will use \n $HOME"
i will use \n /root
root@ARM40:~# echo "i will use \n \$HOME"
i will use \n $HOME
```

echo -e 处理特殊字符
若字符串中出现以下字符，则特别加以处理，而不会将它当成一般文字输出：
\a 发出警告声；
\b 删除前一个字符；
\c 最后不加上换行符号；
\f 换行但光标仍旧停留在原来的位置；
\n 换行且光标移至行首；
\r 光标移至行首，但不换行；
\t 插入tab；
\v 与\f相同；
\\ 插入\字符；
\0nnn 插入nnn（八进制）所代表的ASCII字符；
\xHH 插入HH（十六进制）所代表的ASCII字符；

插入sim卡， cat /dev/ttyUSB2 &，把ttyUSB2的接收放到背景（可用fg取消）。然后 echo AT > /dev/ttyUSB2，于是得到了正确的结果。
[root@Board:/]# cat /dev/ttyUSB2 &
[root@Board:/]#
+CPIN: READY

+QUSIM: 1

+QIND: SMS DONE

+QIND: PB DONE
echo AT > /dev/ttyUSB2
[root@Board:/]# AT // echo AT > /dev/ttyUSB2 或 echo -e "AT\r" > /dev/ttyS6
OK

[root@Board:/]# AT+CPIN? // echo AT+CPIN? > /dev/ttyUSB2 或 echo -e "AT+CPIN?\r" > /dev/ttyS6
+CPIN: READY

OK
echo AT+CPIN? > /dev/ttyUSB2
[root@Board:/]# AT+CPIN?
+CPIN: READY

OK
]

5.2. Test PPP Function

In order to set up PPP call, the following files are required. Please check if they exist in your product.

1. pppd and chat program:

If do not exist, you can download the source code from https://ppp.samba.org/download.html and port to your product.

2. One PPP script file named as "/etc/ppp/ip-up" which is used to set DNS (Domain Name System). If there is no such file on your product, you can use "linux-ppp-scripts\ip-up" provided by Quectel.

3. Three scripts named as "quectel-ppp", "quectel-chat-connect" and "quectel-chat-disconnect". They are provided by Quectel in directory "linux-ppp-scripts". Depending on your product, you may need to make some changes. More information please refers to "linux-ppp-scripts\readme".

You should copy "quectel-ppp", "quectel-chat-connect" and "quectel-chat-disconnect" to the directory "/etc/ppp/peers". Then you can start to set up PPP call by below command:

 # pppd call quectel-ppp &

执行：**# pppd call quectel-ppp &**

cat /dev/ttyUSB2 &
#
+CPIN: READY

+QUSIM: 1

+QIND: SMS DONE

+QIND: PB DONE

echo AT > /dev/ttyUSB2
AT
OK

pppd call quectel-ppp &
pppd options in effect:
debug # (from /etc/ppp/peers/quectel-ppp)
nodetach # (from /etc/ppp/peers/quectel-ppp)
dump # (from /etc/ppp/peers/quectel-ppp)
noauth # (from /etc/ppp/peers/quectel-ppp)
user test # (from /etc/ppp/peers/quectel-ppp)
password ?????? # (from /etc/ppp/peers/quectel-ppp)
remotename 3gppp # (from /etc/ppp/peers/quectel-ppp)
/dev/ttyUSB3 # (from /etc/ppp/peers/quectel-ppp)
115200 # (from /etc/ppp/peers/quectel-ppp)
lock # (from /etc/ppp/peers/quectel-ppp)
connect chat -s -v -f /etc/ppp/peers/quectel-chat-connect # (from /etc/ppp/peers/quectel-ppp)
disconnect chat -s -v -f /etc/ppp/peers/quectel-chat-disconnect # (from /etc/ppp/peers/quectel-ppp)
nocrtscts # (from /etc/ppp/peers/quectel-ppp)
modem # (from /etc/ppp/peers/quectel-ppp)
hide-password # (from /etc/ppp/peers/quectel-ppp)
novj # (from /etc/ppp/peers/quectel-ppp)
novjccomp # (from /etc/ppp/peers/quectel-ppp)
ipcp-accept-local # (from /etc/ppp/peers/quectel-ppp)
ipcp-accept-remote # (from /etc/ppp/peers/quectel-ppp)
ipparam 3gppp # (from /etc/ppp/peers/quectel-ppp)
noipdefault # (from /etc/ppp/peers/quectel-ppp)
ipcp-max-failure 30 # (from /etc/ppp/peers/quectel-ppp)
defaultroute # (from /etc/ppp/peers/quectel-ppp)
usepeerdns # (from /etc/ppp/peers/quectel-ppp)
noccp # (from /etc/ppp/peers/quectel-ppp)

```
abort on (BUSY)
abort on (NO CARRIER)
abort on (NO DIALTONE)
abort on (ERROR)
abort on (NO ANSWER)
timeout set to 30 seconds
send (AT^M)
expect (OK)
AT^M^M
OK
 -- got it

send (ATE0^M)
expect (OK)
^M
ATE0^M^M
OK
 -- got it

send (ATI;+CSUB;+CSQ;+CPIN?;+COPS?;+CGREG?;&D2^M)
expect (OK)
^M
^M
Quectel^M
EC20^M
Revision: EC20CEQAR02A05E2G^M
^M
SubEdition: V04^M
^M
+CSQ: 17,99^M
^M
+CPIN: READY^M
^M
+COPS: 0,0,"CHINA  MOBILE CMCC",7^M
^M
+CGREG: 0,1^M
^M
OK
 -- got it
```

```
send (AT+CGDCONT=1,"IP","3gnet",,0,0^M)
expect (OK)
^M
^M
OK
 -- got it

send (ATD*99#^M)
expect (CONNECT)
^M
^M
CONNECT
 -- got it

Script chat -s -v -f /etc/ppp/peers/quectel-chat-connect finished (pid 854), status = 0x0
Serial connection established.
using channel 1
Using interface ppp0
Connect: ppp0 <--> /dev/ttyUSB3
sent [LCP ConfReq id=0x1 <asyncmap 0x0> <magic 0xf1e9345b> <pcomp> <accomp>]
rcvd [LCP ConfReq id=0x0 <asyncmap 0x0> <auth chap MD5> <magic 0xbba74493>
<pcomp> <accomp>]
sent [LCP ConfAck id=0x0 <asyncmap 0x0> <auth chap MD5> <magic 0xbba74493>
<pcomp> <accomp>]
rcvd [LCP ConfAck id=0x1 <asyncmap 0x0> <magic 0xf1e9345b> <pcomp> <accomp>]
rcvd [LCP DiscReq id=0x1 magic=0xbba74493]
rcvd [CHAP Challenge id=0x1 <004849f5ce75169e767890d400f8d458>, name =
"UMTS_CHAP_SRVR"]
sent [CHAP Response id=0x1 <fe8381499e5dfb048e26b40e273c9216>, name = "test"]
rcvd [CHAP Success id=0x1 ""]
CHAP authentication succeeded
CHAP authentication succeeded
sent [IPCP ConfReq id=0x1 <addr 0.0.0.0> <ms-dns1 0.0.0.0> <ms-dns2 0.0.0.0>]
rcvd [IPCP ConfReq id=0x0]
sent [IPCP ConfNak id=0x0 <addr 0.0.0.0>]
rcvd [IPCP ConfNak id=0x1 <addr 10.144.195.247> <ms-dns1 211.136.112.50> <ms-dns2
211.136.150.66>]
sent [IPCP ConfReq id=0x2 <addr 10.144.195.247> <ms-dns1 211.136.112.50> <ms-dns2
```

```
211.136.150.66>]
rcvd [IPCP ConfReq id=0x1]
sent [IPCP ConfAck id=0x1]
rcvd [IPCP ConfAck id=0x2 <addr 10.144.195.247> <ms-dns1 211.136.112.50> <ms-dns2
211.136.150.66>]
Could not determine remote IP address: defaulting to 10.64.64.64
local  IP address 10.144.195.247
remote IP address 10.64.64.64
primary   DNS address 211.136.112.50
secondary DNS address 211.136.150.66
Script /etc/ppp/ip-up started (pid 858)
Script /etc/ppp/ip-up finished (pid 858), status = 0x0

#
# ifconfig ppp0
ppp0      Link encap:Point-to-Point Protocol
          inet addr:10.144.195.247  P-t-P:10.64.64.64  Mask:255.255.255.255
          UP POINTOPOINT RUNNING NOARP MULTICAST  MTU:1500  Metric:1
          RX packets:4 errors:0 dropped:0 overruns:0 frame:0
          TX packets:4 errors:0 dropped:0 overruns:0 carrier:0
          collisions:0 txqueuelen:3
          RX bytes:52 (52.0 B)  TX bytes:58 (58.0 B)

# cat /etc/resolv.conf
nameserver 211.136.112.50
nameserver 211.136.150.66
# route -n
Kernel IP routing table
Destination     Gateway         Genmask         Flags Metric Ref    Use Iface
0.0.0.0         0.0.0.0         0.0.0.0         U     0      0        0 ppp0
10.64.64.64     0.0.0.0         255.255.255.255 UH    0      0        0 ppp0
# ping www.baidu.com
PING www.baidu.com (111.13.100.92): 56 data bytes
64 bytes from 111.13.100.92: seq=0 ttl=53 time=60.059 ms
64 bytes from 111.13.100.92: seq=1 ttl=53 time=53.374 ms
64 bytes from 111.13.100.92: seq=2 ttl=53 time=57.238 ms
^C
--- www.baidu.com ping statistics ---
3 packets transmitted, 3 packets received, 0% packet loss
```

round-trip min/avg/max = 53.374/56.890/60.059 ms
#