



▶ **Marvell.** Moving Forward Faster



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pxa1826 usb Introduction

Introduction content

- Pxa1826 usb resource
- Usb otg Features
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- How to add usb3.0 gadget drvier
- What we support

Pxa1826 usb resource

► Rich usb resource:

usb otg ,support usb2.0 host ,usb2.0 device and role switch. Use marvell 28nm phy.

usb hsic ,inlcude hsic standard host and hsic standard device.
Use marvell 28nm phy.

usb 3.0 ,support usb3.0 device and usb2.0 device .Use marvell 28nm phy.

Usb otg Features

► independently from the USB3 controller.

For otg controller , no matter hardware and software , can work without usb3.

In nz3 ,we have two usb IP ,the one is otg that include usb2 controller ,the other is usb3 that include usb3 controller and another usb2 controller .The two usb2 controller use the same phy.currently ,we use usb3 controller(just usb3) +otg (include the usb2 controller).

Usb otg Features

► Support EHCI

```
.config - Linux/arm 3.10.33 Kernel Configuration
> Device Drivers > USB support

USB support
Arrow keys navigate the menu. <Enter> selects submenus --->.
Highlighted letters are hotkeys. Pressing <Y> includes, <N> excludes,
<M> modularizes features. Press <Esc><Esc> to exit, <?> for Help, </>
for Search. Legend: [*] built-in [ ] excluded <M> module < >

^ (-)
< > USB Monitor
<Y> Support WUSB Cable Based Association (CBA)
*** USB Host Controller Drivers ***
< > Cypress C67x00 HCD support
< > xHCI HCD (USB 3.0) support
<M> EHCI HCD (USB 2.0) support
--*-- Root Hub Transaction Translators
[ ] Improved Transaction Translator scheduling
[*] EHCI support for Marvell PXA/MMP USB controller
[*] EHCI support for PXA USB OTG controller
v (+)

<Select> < Exit > < Help > < Save > < Load >
```

support u-disk, and some common device .

Usb otg Features

► Support EHCI

```

root@OpenWrt:/mnt/upan# [ 693.465270] usb 1-1: new high-speed USB device numbei
[ 693.618072] usb 1-1: New USB device found, idVendor=0dd8, idProduct=1f04
[ 693.624847] usb 1-1: New USB device strings: Mfr=1, Product=2, SerialNumber=3
[ 693.632293] usb 1-1: Product: OnlyDisk
[ 693.636993] usb 1-1: Manufacturer: Netac
[ 693.641174] usb 1-1: SerialNumber: 002522009857F0209BB2163C
[ 693.650512] usb-storage 1-1:1.0: USB Mass Storage device detected
[ 693.665557] scsi5 : usb-storage 1-1:1.0
[ 694.676300] scsi 5:0:0:0: Direct-Access    Netac    OnlyDisk    1.00 P2
[ 694.688385] sd 5:0:0:0: [sdc] 3844063 512-byte logical blocks: (1.96 GB/1.83)
[ 694.697753] sd 5:0:0:0: [sdc] Write Protect is off
[ 694.703155] sd 5:0:0:0: [sdc] No Caching mode page found
[ 694.708801] sd 5:0:0:0: [sdc] Assuming drive cache: write through
[ 694.719482] sd 5:0:0:0: [sdc] No Caching mode page found
[ 694.731323] sd 5:0:0:0: [sdc] Assuming drive cache: write through
[ 694.756072]  sdc:
[ 694.763000] sd 5:0:0:0: [sdc] No Caching mode page found
[ 694.776519] sd 5:0:0:0: [sdc] Assuming drive cache: write through
[ 694.782745] sd 5:0:0:0: [sdc] Attached SCSI removable disk

```

```

root@OpenWrt:/mnt/upan# mkfs.exfat /dev/sdc
mkexfatfs 1.1.0
Creating... done.
Flushing... done.
File system created successfully.

```

Usb otg Features

- ▶ **Support usb2.0 low/full/high device**

Usb otg Features

▶ role switch

we decide the role with static state. We use usb ID cable to decide if we are host or device .Like nz3+PC, we will be device, nz3+U disk, we will be host.

Usb otg Features

Code : drivers/usb/gadget/mv_udc_core.c

drivers/usb/host/ehci-mv.c

drivers/usb/phy-mv-usb.c

Hsic host/device Features

▶ HSIC host support

HSIC is a 2-signal (strobe,data) source synchronous serial interface which uses 240MHz DDR signaling to provide High-Speed 480Mbps USB transfers which are 100% host driver compatible with traditional USB cable-connected topologies.

- ▶ High-Speed 480Mbps data rate only
- ▶ Source-synchronous serial interface
- ▶ No power consumed unless a transfer is in progress
- ▶ Maximum trace length of 10cm
- ▶ No hot Plug-n-Play support, no hot removal/attach
- ▶ Designed for low-power applications
- ▶ No high-speed chirp protocol, the HSIC interface is always operated at high-speed

Hsic host/device Features

▶ HSIC host support

support LAN smsc9730 . The LAN9730 is a high-performance, small form factor solution for USB to 10/100 Ethernet port bridging.

Hsic host/device Features

► HSIC host support

How to do board connection and HSIC test

1.add smsc host driver to kernel

Arrow keys navigate the menu. <Enter> selects submenus --->. Highlighted letters are hotkeys. Pressing <Y> includes, <N> excludes, <M> modularizes features. Press <Esc><Esc> to exit, <?> for Help, </> for Search. Legend: [*] built-in [] excluded <M> module < >

^ (-)

```
<*> ASIX AX88179/178A USB 3.0/2.0 to Gigabit Ethernet
<*> CDC Ethernet support (smart devices such as cable modems)
< > CDC EEM support
< > CDC NCM support
< > CDC MBIM support
< > Davicom DM9601 based USB 1.1 10/100 ethernet devices
< > SMSC LAN75XX based USB 2.0 gigabit ethernet devices
<*> SMSC LAN95XX based USB 2.0 10/100 ethernet devices
< > GeneSys GL620USB-A based cables
< > NetChip 1080 based cables (Laplink, ...)
```

v (+)

<Select>

< Exit >

< Help >

< Save >

< Load >

Hsic host/device Features

► HSIC host support

```

                                USB support
Arrow keys navigate the menu.  <Enter> selects submenus --->.
Highlighted letters are hotkeys.  Pressing <Y> includes, <N> excludes,
<M> modularizes features.  Press <Esc><Esc> to exit, <?> for Help, </>
for Search.  Legend: [*] built-in  [ ] excluded  <M> module  < >

^ (-)
< >      Cypress C67x00 HCD support
< >      xHCI HCD (USB 3.0) support
<*>      EHCI HCD (USB 2.0) support
-*-*      Root Hub Transaction Translators
[ ]       Improved Transaction Translator scheduling
[*]       EHCI support for Marvell PXA/MMP USB controller
[*]       EHCI support for PXA USB OTG controller
[*]       EHCI support for PXA USB HSIC controller
<*>      Generic EHCI driver for a platform device
< >      OXU210HP HCD support
v (+)

<Select>  < Exit >  < Help >  < Save >  < Load >

```

Hsic host/device Features

▶ HSIC host support

2.settings for the EVB-LAN9730-MI (use jumper for settings)

we just setting JP5 to External Reset Connect ,others use default.

3.use two U.FL coaxial cables to connect SMSC 9730 and dkb,power on 9730 first.

4.after connect successfully ,we can see a new NIC named eth0 in system .

Hsic host/device Features

▶ HSIC host support

```
Press the [f] key and hit [enter] to enter failsafe mode
Press the [1], [2], [3] or [4] key and hit [enter] to select the debug level
[ 5.205078] usb 1-1: new high-speed USB device number 2 using mv-ehci
[ 5.335052] usb 1-1: new high-speed USB device number 3 using mv-ehci
[ 5.465057] usb 1-1: new high-speed USB device number 4 using mv-ehci
[ 5.495697] usb 1-1: New USB device found, idVendor=0424, idProduct=9730
[ 5.502441] usb 1-1: New USB device strings: Mfr=0, Product=0, SerialNumber=0
[ 5.514129] smsc95xx v1.0.4
[ 5.580200] smsc95xx 1-1:1.0 eth0: register 'smc95xx' at usb-mv ehci-1, smc95xx USB 2.0 Ethernet, be:72:eb:aa:9c:29
```

```
eth0      Link encap:Ethernet  HWaddr BE:72:EB:AA:9C:29
          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)
```


Hsic host/device Features

- ▶ **HSIC device support**
we didn't support this currently.

Hsic host/device Features

- ▶ **Code:drivers/usb/core/hub.c**
- drivers/usb/host/ehci/hcd.c**
- drivers/usb/host/ehci/hub.c**
- drivers/usb/host/ehci-mv.c**

Usb3.0 Features

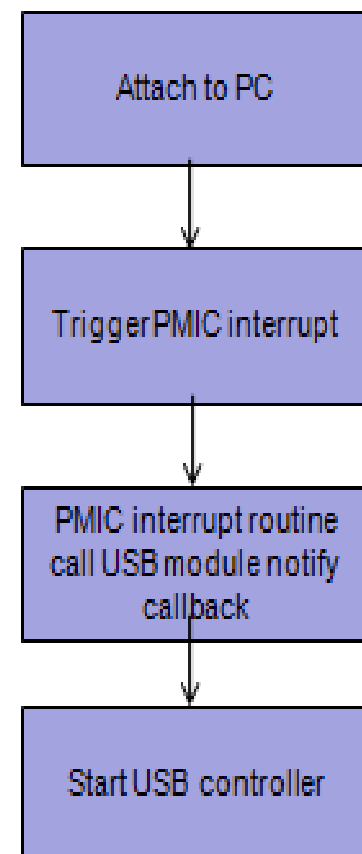
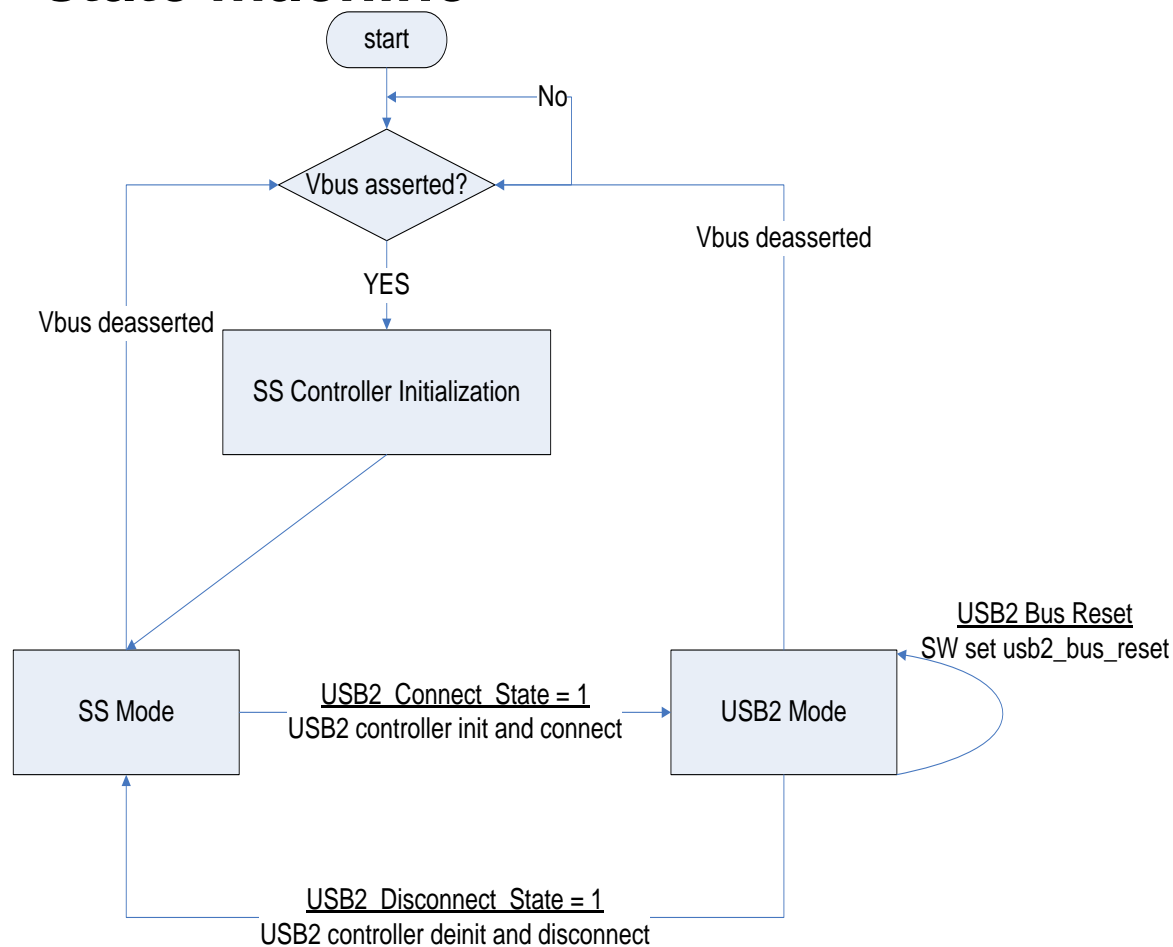
- ▶ **1. Super speed: 5Gbps, Dual-simplex, Compatible with USB2.0.**
- ▶ **2.support four state to save power-- U0/U1/U2/U3**
- ▶ **3.have burst transfer function.**
- ▶ **4.Two different IP controller: USB2 and USB3.**

Usb3.0 Features

- ▶ 1. Code: `linux\drivers\usb\mvc2\`
- ▶ 2. Driver switch(USB3 <--> USB2):
`linux\drivers\usb\mvc2\glue.c`
- ▶ 3. One composite
device(`linux\drivers\usb\gadget\android.c`).

Usb3.0 Features

state machine



How to add usb3.0 gadget drvie

Need to add super speed descriptors for USB3.

Take rndis for example(linux\drivers\usb\gadget\f_rndis.c):

```

283  /* super speed support: */
284
285 ⊕ static struct usb_endpoint_descriptor ss_notify_desc = {
293  L };
294
295 ⊕ static struct usb_ss_ep_comp_descriptor ss_intr_comp_desc = {
303  L };
304
305 ⊕ static struct usb_endpoint_descriptor ss_in_desc = {
312  L };
313
314 ⊕ static struct usb_endpoint_descriptor ss_out_desc = {
321  L };
322
323 ⊕ static struct usb_ss_ep_comp_descriptor ss_bulk_comp_desc = {
330  L };
331
332 ⊕ static struct usb_descriptor_header *eth_ss_function[] = {
351  L };

```

What we support(usb 2/3 device)

▶ usb gadgets driver

We can support marvell modem function,diag_function,acm_function,rndis_function, suelog_function, mass_storage_function, ecm_function, mbim_function, ncm_function.

But being limited to usb3 ep ,we just support four function.

What we support(usb 2/3 device)

▶ VID & PID

Default vendor and product IDs

- #define VENDOR_ID 0x1286
- #define PRODUCT_ID 0x4e28

echo 1286 > /sys/class/android_usb/android0/idVendor

echo 4e28 > /sys/class/android_usb/android0/idProduct

echo Marvell > /sys/class/android_usb/android0/iManufacturer

Default function

rndis,acm,marvell_diag,marvell_debug

What we support(usb 2/3 device)

► Os detect

```

USB Gadget Support
Arrow keys navigate the menu. <Enter> selects submenus --->.
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^ (-)
<*>  USB Gadget Drivers (Android Composite Gadget)  --->
      Android Composite Gadget
      [*]      Use double word aligned
      [*]      enable rndis multi packets mode
      [*]      MBIM Gadget Driver
      [*]      Detect The OS Type Of The Host
      [*]      Enable Remote Wakeup Function
<*>  Marvell Central IP USB3 Core Support
      [*]      Enable Debugging Messages
      [*]      Enable Gadget Detection

<Select>  < Exit >  < Help >  < Save >  < Load >

```

What we support(usb 2/3 device)

▶ Os detect

We support os detect function that is we can judge the os type that usb is connecting,then match a suitable composite function.

For win7/linux, we use rndis,acm,marvell_diag,marvell_debug.

For win8,we use mbim,marvell_diag.

For mac , we use ecm.

```
echo rndis,acm,marvell_diag,marvell_debug >
/sys/class/android_usb/android0/win7
```

```
echo mbim,marvell_diag > /sys/class/android_usb/android0/win8
```

```
echo ecm > /sys/class/android_usb/android0/apple
```

```
echo win8 > /sys/class/android_usb/android0/os
```

What we support(usb 2/3 device)

► Usb remote wakeup

```

Arrow keys navigate the menu. <Enter> selects submenus --->.
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<Select>  < Exit >  < Help >  < Save >  < Load >

```

We support remote wakeup according usb protocol both usb2.0 and usb3.0.We can use this feature to wakeup a sleep host.

What we support(usb 2/3 device)

▶ Support BC 1.2

usb2.0 phy can supply the right charger type for charger(SDP,CDP,DCP).

What we support(usb 2/3 device)

➤ Function driver

✓ Open source function driver

drivers/usb/gadget/f_mass_storage.c

drivers/usb/gadget/u_serial.c

drivers/usb/gadget/f_acm.c

drivers/usb/gadget/f_rndis.c

drivers/usb/gadget/u_ether.c

✓ Marvell special function driver

drivers/usb/gadget/pxa910_u_serial.c

drivers/usb/gadget/pxa910_f_diag.c

drivers/usb/gadget/pxa910_f_modem.c

drivers/usb/gadget/pxa182x_acm_debug.c

What we support(usb 2/3 device)

▶ Performace test

For UT test : usb2.0 ~280Mbps

usb3.0 ~700Mbps

smc9730 ~99.6Mbps

End