

M A R V E L L[®]



PXA1826 Display Introduction

Overview

- PXA1826 platform supports two display solutions based directFB for different customer requirement.
 - lcd controller/panel support up to 30 fps video playback with VGA(640*480) resolution.
 - OLED display support up to 5~10 fps with I2C/SPI interface.

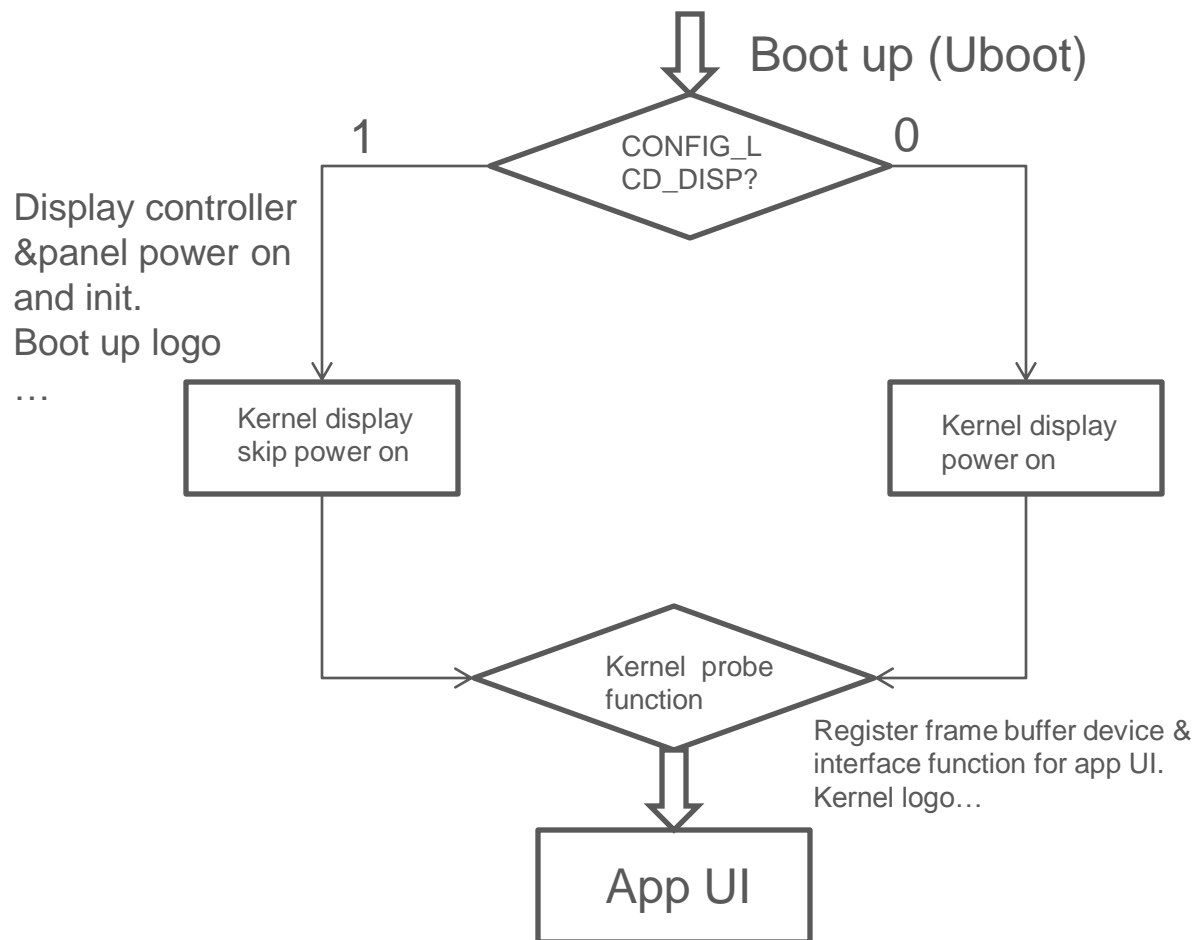
Overview

- LCD display
 - PXA1826 display work flow
 - Display in uboot
 - Kernel driver layout
 - Frame buffer driver
 - Panel interface(SSD1963 panel in SAAR-N)
 - Add one new panel step by step
- OLED display

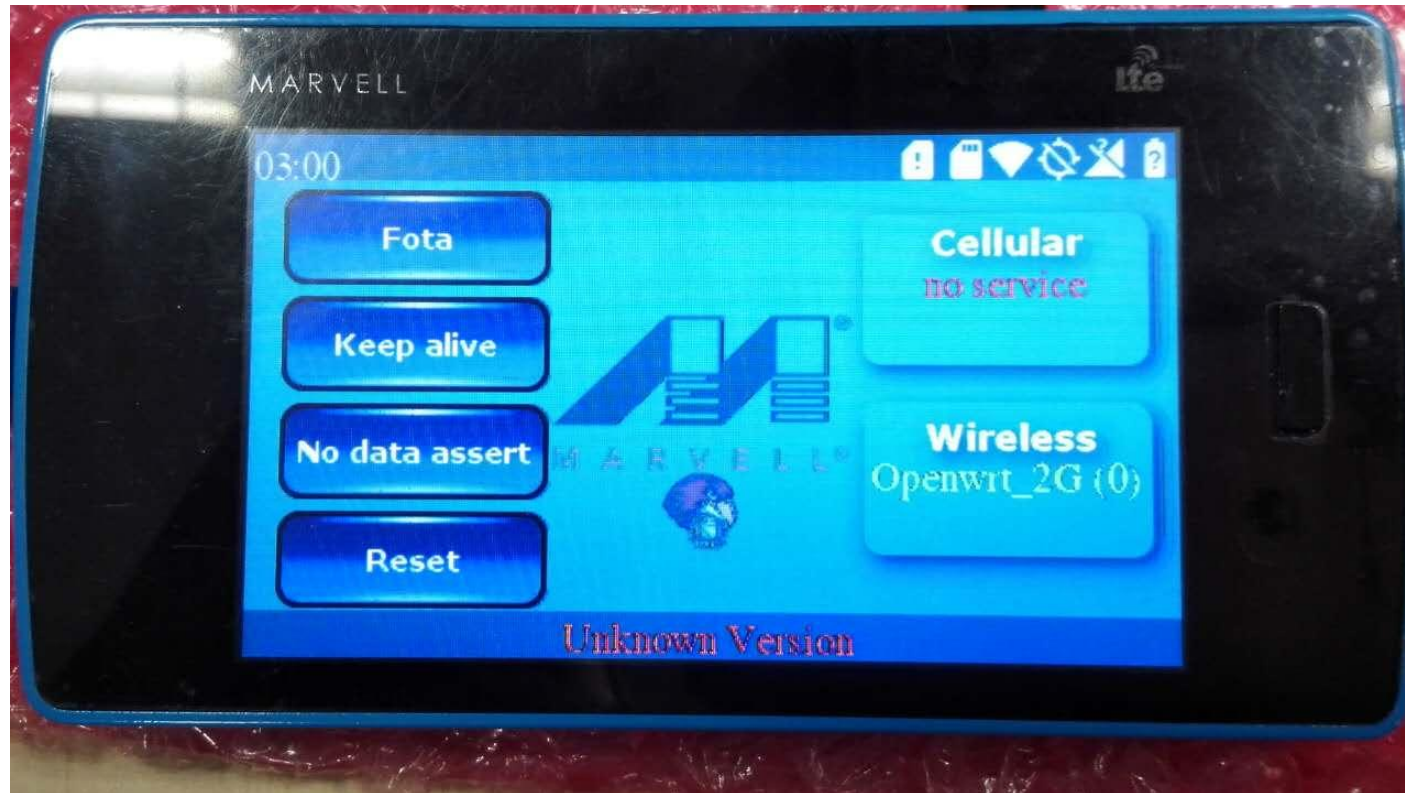
LCD display

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PXA1826 display work flow



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Display in uboot

- Code layout (SAAR-N):

uboot

- board/
 - Marvell/
 - nezha3_saar_n/
 - » nezha3_saar_n.c
 - » ssd1963.c
- drivers/
 - video/
 - pxa1826fb.c
- include/
 - nezha3_saar_n.h

Display in uboot

- pxa1826_fb_init()
 - Enable display controller clock
 - Boot up marvell logo
- lcd_show_battery_stage(int stage)
 - stage: -1(no battery)~20
- lcd_show_logo()

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Kernel driver layout

- linux
 - drivers/
 - video/
 - pxa1826fb.c
 - backlight/
 - » ssd1963.c
 - clk/
 - mmp/
 - » clk-pxa182x.c
 - include/
 - video/
 - pxa1826fb.h

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Frame buffer driver

- struct pxa1826fb_info {
 ...
 struct clk *clk;
 struct fb_info *info;
 struct pxa1826fb_mach_info *mi;
 ...
}
- struct clk *clk: lcd controller clock information.
- struct fb_info *info: framebuffer structure which kernel use
- struct pxa1826fb_mach_info *mi: display panel information structure.
 included display panel callback function handler and private variables.
 It will be different with different panels on board.
- Frame buffer device is in /dev/fb0

Frame buffer driver

- static struct fb_ops pxa1826fb_ops = {
 ...
 .fb_blank = pxa1826fb_blank,
 .fb_pan_display = pxa1826fb_pan_display,
 ...
};
• pxa1826fb_blank: support blank display and manual display operations for APP use by fb ioctl.

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Panel interface(SSD1963 panel in SAAR-N)

- struct pxa1826fb_mach_info ssd1963_panel_info = {
 .pix_fmt = SSD1963_FORMAT,
 .pxa1826fb_lcd_power = ssd1963_power,
 .xres = SSD1963_XRES,
 .yres = SSD1963_YRES,
};
- pix_fmt: display panel color format.
- ssd1963_power: ssd1963 panel power on/off callback function for init sequence and suspend/resume operation.
- xres/ yres: panel resolution and will be set to fb_var_screeninfo in fb device.

Panel interface(SSD1963 panel in SAAR-N)

```

• struct ssd1963 {
    struct device                *dev;
    unsigned int                 current_brightness;
    int                           power;
    int                           mode;
    struct lcd_device             *lcd;
    struct backlight_device       *backlight;
    struct lcd_platform_data      *lcd_plat;
    int (*send_cmd_data)(struct ssd1963 *lcd, u32 cmd, u8 cmd_data);

    u32 bus_width;
    struct regulator *lcd_iovdd;
    int lcd_rst_n;
    int lcd_bl_en;
};

```

- panel private variables from dts: bus_width/lcd_iovdd/...
- Device object information: lcd/backlight
- Callback function: send_cmd_data()

Panel interface(SSD1963 panel in SAAR-N)

- void ssd1963_power(int power)

fbi->mi->pxa1826fb_lcd_power(int power) callback function handler in pxa1826fb.c.
This function supports ssd1963 panel to power on/off.

- void ssd1963_fb_start(gfp_t flags)

fbi->mi->pxa1826fb_fb_start(gfp_t flags) callback function handler in pxa1826fb.c and
need to called before update each frame buffer.

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Add one new panel step by step

1. Add lcd panel information to board dts file.

2. Put all panel private variables to

```
– struct panel_xxx{  
    ...  
    struct lcd_device          *lcd;  
    struct backlight_device    *backlight;  
    ...  
}
```

3. Set xxx_ops callback function for lcd and backlight and register lcd and backlight device.

```
panel->dev = &pdev->dev;  
panel->lcd = lcd_device_register("ssd1963", &pdev->dev, panel,  
                                &ssd1963_ops);
```

...

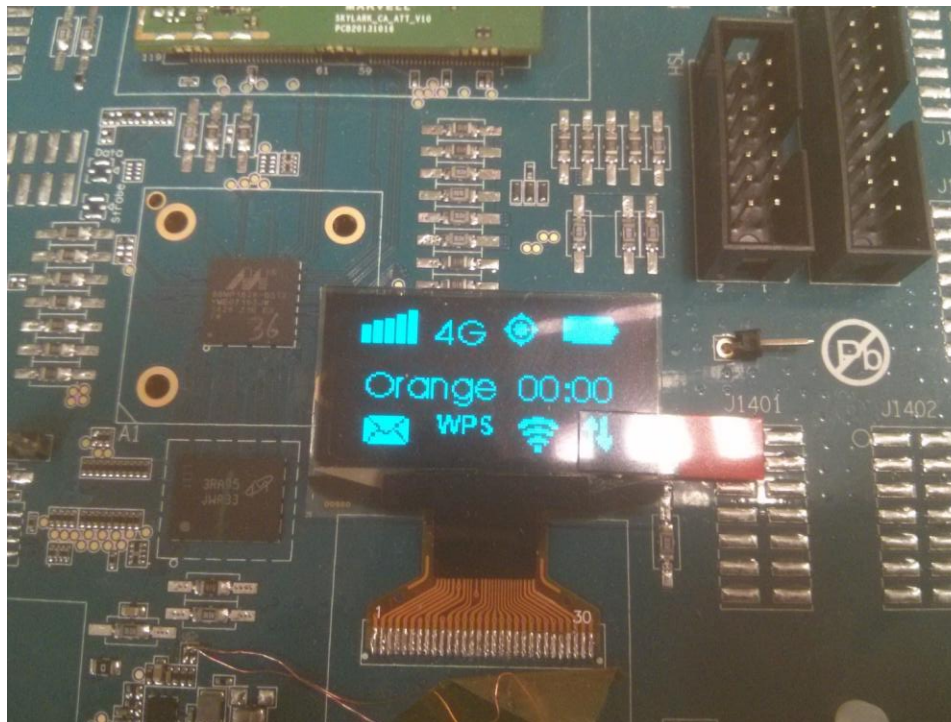
```
bl = backlight_device_register("lcd-bl", &pdev->dev, panel,  
                               &ssd1963_ls_bl_ops, &props);
```

Add one new panel step by step

4. Set `xxx_power(int power)` to power on/off panel.
5. Set `xxx_fb_start(gfp_t flags)` if panel need to send memory write command before each frame update.

OLED display

- Supports generic icons layout for 3 areas (top, center, bottom)



Thanks!