

Minimal Device Tree Changes for AM625-SK U-Boot

Overview

This document describes all changes made to create a minimal U-Boot device tree configuration for the AM625-SK board, optimized for **SD card boot with UART console only**.

Patch Summary

- **Files Modified:**
 - dts/upstream/src/arm64/ti/k3-am625-sk.dts
 - dts/upstream/src/arm64/ti/k3-am62x-sk-common.dtsi

Changes in k3-am625-sk.dts

1. Removed CPU Frequency Scaling (OPP Table)

```
- opp-table {  
- /* Add 1.4GHz OPP for am625-sk board */  
- opp-1400000000 {  
-     opp-hz = /bits/ 64 <1400000000>;  
-     opp-supported-hw = <0x01 0x004>;  
-     clock-latency-ns = <6000000>;  
- };  
- };
```

Reason: CPU frequency scaling not needed for boot; default frequencies are sufficient.

2. Removed 1.8V Regulator

```
- vcc_1v8: regulator-5 {  
- /* output of TPS6282518DMQ */  
- compatible = "regulator-fixed";  
- regulator-name = "vcc_1v8";  
- regulator-min-microvolt = <1800000>;  
- regulator-max-microvolt = <1800000>;  
- vin-supply = <&vcc_3v3_sys>;  
- regulator-always-on;  
- regulator-boot-on;  
- };
```

Reason: Only needed for audio codec (TLV320AIC3106 DVDD supply), which is not used in minimal boot.

3. Removed eMMC Support (sdhci0)

```
-&sdhci0 {  
- bootph-all;  
- status = "okay";  
- pinctrl-names = "default";  
- pinctrl-0 = <&main_mmc0_pins_default>;  
- disable-wp;  
- };
```

Reason: Boot target is SD card only (sdhci1); eMMC not needed.

4. Removed Ethernet Port 2 and Time Synchronization

```

-&cpsw3g {
- pinctrl-names = "default";
- pinctrl-0 = <&main_rgmii1_pins_default>, <&main_rgmii2_pins_default>;
-
- cps@3d000 {
- /* MAP HW3_TS_PUSH to GENF1 */
- ti,pps = <2 1>;
- };
-};
-
-&cpsw_port2 {
- phy-mode = "rgmii-rxid";
- phy-handle = <&cpsw3g_phy1>;
-};
-
-&cpsw3g_mdio {
- cpsw3g_phy1: ethernet-phy@1 {
- reg = <1>;
- ti,rx-internal-delay = <DP83867_RGMIIIDCTL_2_00_NS>;
- ti,fifo-depth = <DP83867_PHYCR_FIFO_DEPTH_4_B_NIB>;
- ti,min-output-impedance;
- };
-};

```

Reason: Network boot not required; both Ethernet ports removed.

5. Removed SPI Flash (OSPI) Configuration

```

-&fss {
- bootph-all;
-};
-
-&ospi0 {
- flash@0 {
- bootph-all;
- compatible = "jedec,spi-nor";
- reg = <0x0>;
- spi-tx-bus-width = <8>;
- spi-rx-bus-width = <8>;
- spi-max-frequency = <25000000>;
- /* ... */
- partitions {
- /* Multiple partitions removed */
- };
- };
-};

```

Reason: Booting from SD card only; SPI flash not needed for boot storage.

6. Removed Audio Codec Power Supply Reference

```

-&tlv320aic3106 {
- DVDD-supply = <&vcc_1v8>;
-};

```

Reason: Audio codec not used in minimal configuration.

7. Removed Time Synchronization Router

```
-&timesync_router {  
- mux-reg-masks-state = <  
- K3_TS_OFFSET(12, 0x0001ffff, 17)  
- >;  
- status = "okay";  
-};
```

Reason: Time synchronization not needed for basic boot functionality.

Changes in `k3-am62x-sk-common.dtsi`

1. Removed Device Aliases

```
aliases {  
    serial0 = &wkup_uart0;  
    serial1 = &mcu_uart0;  
    serial2 = &main_uart0;  
- mmc0 = &sdhci0;          /* eMMC */  
    mmc1 = &sdhci1;          /* SD card - KEPT */  
    mmc2 = &sdhci2;  
- spi0 = &ospi0;            /* SPI flash */  
- ethernet0 = &cpsw_port1; /* Ethernet port 1 */  
- ethernet1 = &cpsw_port2; /* Ethernet port 2 */  
    usb0 = &usb0;            /* USB0 - KEPT */  
- usb1 = &usb1;            /* USB1 host */  
};
```

Reason: Only SD card (mmc1), UART (serial*), and USB0 aliases needed for minimal boot.

2. Removed Framebuffer Configuration

```
chosen {  
    stdout-path = "serial2:115200n8";  
-  
- framebuffer0: framebuffer@0 {  
-     compatible = "simple-framebuffer";  
-     power-domains = <&k3_pds 186 TI_SCI_PD_EXCLUSIVE>;  
-     clocks = <&k3_clks 186 6>,  
-       <&dss_vp1_clk>,  
-       <&k3_clks 186 2>;  
-     display = <&dss>;  
-     status = "disabled";  
- };  
};
```

Reason: Display/framebuffer not needed for UART console boot.

3. Removed Reserved Memory Regions

A. Ramoops (Kernel Crash Logging)

```
- ramoops@9c700000 {
- compatible = "ramoops";
- reg = <0x00 0x9c700000 0x00 0x00100000>;
- record-size = <0x8000>;
- console-size = <0x8000>;
- ftrace-size = <0x00>;
- pmsg-size = <0x8000>;
- };
```

Reason: Kernel crash logging not needed for U-Boot boot phase.

B. RTOS IPC Memory

```
- rtos_ipc_memory_region: ipc-memories@9c800000 {
- compatible = "shared-dma-pool";
- reg = <0x00 0x9c800000 0x00 0x00300000>;
- no-map;
- };
```

Reason: Inter-processor communication with remote processors removed (M4F, R5F).

4. Removed LED Configuration

```
- leds {
- compatible = "gpio-leds";
- pinctrl-names = "default";
- pinctrl-0 = <&usr_led_pins_default>;
-
- led-0 {
- label = "am62-sk:green:heartbeat";
- gpios = <&main_gpio1 49 GPIO_ACTIVE_HIGH>;
- linux,default-trigger = "heartbeat";
- function = LED_FUNCTION_HEARTBEAT;
- default-state = "off";
- };
- };
```

Reason: User LEDs not essential for boot functionality.

5. Removed Audio Subsystem

A. Audio Master Clock

```
- tlv320_mclk: clk-0 {
- #clock-cells = <0>;
- compatible = "fixed-clock";
- clock-frequency = <12288000>;
- };
```

B. Audio Card Configuration

```

- codec_audio: sound {
-   compatible = "simple-audio-card";
-   simple-audio-card,name = "AM62X-SKEVM";
-   simple-audio-card,widgets =
-     "Headphone", "Headphone Jack",
-     "Line", "Line In",
-     "Microphone", "Microphone Jack";
-   /* ... additional configuration ... */
- };

```

C. Audio Codec (I2C1)

```

- tlv320aic3106: audio-codec@1b {
-   #sound-dai-cells = <0>;
-   compatible = "ti,tlv320aic3106";
-   reg = <0x1b>;
-   ai3x-micbias-vg = <1>;
-   AVDD-supply = <&vcc_3v3_sys>;
-   IOVDD-supply = <&vcc_3v3_sys>;
-   DRVDD-supply = <&vcc_3v3_sys>;
- };

```

D. McASP Audio Interface

```

-&mcasp1 {
-   status = "okay";
-   #sound-dai-cells = <0>;
-   pinctrl-names = "default";
-   pinctrl-0 = <&main_mcasp1_pins_default>;
-   op-mode = <0>;
-   tdm-slots = <2>;
-   serial-dir = < 1 0 2 0 0 0 0 0 0 0 0 0 0 0 0 0 >;
-};

```

Reason: Complete audio subsystem not needed for minimal boot.

6. Removed Display/HDMI Subsystem

A. HDMI Connector

```

- hdmi0: connector-hdmi {
-   compatible = "hdmi-connector";
-   label = "hdmi";
-   type = "a";
-   port {
-     hdmi_connector_in: endpoint {
-       remote-endpoint = <&ii9022_out>;
-     };
-   };
- };

```

B. HDMI Bridge (I2C1)

```

- sii9022: bridge-hdmi@3b {
-   compatible = "sil,sii9022";
-   reg = <0x3b>;
-   interrupt-parent = <&exp1>;
-   interrupts = <16 IRQ_TYPE_EDGE_FALLING>;
-   #sound-dai-cells = <0>;
-   sil,i2s-data-lanes = < 0 >;
-   ports {
-       /* Port configurations */
-   };
- };

```

C. Display Subsystem (DSS)

```

-&dss_olddi_io_ctrl {
-   bootph-all;
-};
-
-&dss {
-   bootph-all;
-   status = "okay";
-   pinctrl-names = "default";
-   pinctrl-0 = <&main_dss0_pins_default>;
-};
-
-&dss_ports {
-   hdmi0_dss: port@1 {
-       reg = <1>;
-       dpi1_out: endpoint {
-           remote-endpoint = <&sii9022_in>;
-       };
-   };
-};

```

Reason: Display output not needed for UART console-only boot.

7. Removed Ethernet Subsystem

A. CPSW MAC Syscon

```

-&cpsw_mac_syscon {
-   bootph-all;
-};

```

B. Ethernet Controller and Ports

```

-&cpsw3g {
-   bootph-all;
-   pinctrl-names = "default";
-   pinctrl-0 = <&main_rgmii1_pins_default>;
-};
-
-&cpsw_port1 {
-   bootph-all;
-   phy-mode = "rgmii-rxid";
-   phy-handle = <&cpsw3g_phy0>;
-};

```

C. Ethernet PHY (MDIO)

```

-&cpsw3g_mdio {
- bootph-all;
- status = "okay";
- pinctrl-names = "default";
- pinctrl-0 = <&main_mdio1_pins_default>;
-
- cpsw3g_phy0: ethernet-phy@0 {
- bootph-all;
- reg = <0>;
- ti,rx-internal-delay = <DP83867_RGMIIIDCTL_2_00_NS>;
- ti,fifo-depth = <DP83867_PHYCR_FIFO_DEPTH_4_B_NIB>;
- ti,min-output-impedance;
- };
-};

```

Reason: Network boot not required; SD card is the boot source.

8. Removed I2C2 Peripheral

```

-&main_i2c2 {
- status = "okay";
- pinctrl-names = "default";
- pinctrl-0 = <&main_i2c2_pins_default>;
- clock-frequency = <400000>;
-};

```

Reason: No critical devices on I2C2 bus needed for boot.

9. Removed USB1 Host Port

```

-&usbss1 {
- status = "okay";
- ti,vbus-divider;
-};
-
-&usb1 {
- dr_mode = "host";
- pinctrl-names = "default";
- pinctrl-0 = <&main_usb1_pins_default>;
-};

```

Reason: Only USB0 needed for potential DFU boot or peripheral mode.

10. Removed SPI Flash (OSPI0)

```

-&ospi0 {
- bootph-all;
- status = "okay";
- pinctrl-names = "default";
- pinctrl-0 = <&ospi0_pins_default>;
-};

```

Reason: Not using SPI flash as boot source; SD card is primary boot device.

11. Removed PRUSS UART

```
-&pruss_uart {  
- pinctrl-names = "default";  
- pinctrl-0 = <&pruss_uart_pins>;  
- status = "okay";  
-};
```

Reason: PRU (Programmable Real-time Unit) subsystem not needed for basic boot.