Kernel Device Tree Changes for AM625-SK

Overview

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

Patch Summary

- **Files Modified**:
    - `arch/arm64/boot/dts/ti/k3-am625-sk.dts`
    - `arch/arm64/boot/dts/ti/k3-am62x-sk-common.dtsi`

Changes in `k3-am625-sk.dts`

1: Remove CPU OPP Table (1.4 GHz)

```
-    opp-table {
-        /* Add 1.4GHz OPP for am625-sk board. Requires VDD_CORE to be at
-        opp-1400000000 {
-            opp-hz = /bits/ 64 <1400000000>;
-            opp-supported-hw = <0x01 0x0004>;
-            clock-latency-ns = <6000000>;
-        };
-    };
```

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

2: Remove 1.8V Regulator (vcc_1v8)

```
-    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: Supplies power to audio codec and other disabled peripherals.

3: Remove eMMC/SD Controller (sdhci0)

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

Reason: eMMC not required. SD card (sdhci1) used for boot.

4: Remove Ethernet Switch (cpsw3g)

```
-&cpsw3g {
-    pinctrl-names = "default";
-    pinctrl-0 = <&main_rgmii1_pins_default>, <&main_rgmii2_pins_default>;
-
-    cpts@3d000 {
-        /* MAP HW3_TS_PUSH to GENF1 */
-        ti,pps = <2 1>;
-    };
-};
```

Reason: Networking disabled for minimal configuration.

5: Remove Ethernet Port 2 (cpsw_port2)

```
-&cpsw_port2 {
-    phy-mode = "rgmii-rxid";
-    phy-handle = <&cpsw3g_phy1>;
-};
```

Reason: Network functionality disabled for minimal boot.

6: Remove Ethernet PHY Configuration (cpsw3g_phy1)

```
-&cpsw3g_mdio {
-    cpsw3g_phy1: ethernet-phy@1 {
-        reg = <1>;
-        ti,rx-internal-delay = <DP83867_RGMIIDCTL_2_00_NS>;
-        ti,fifo-depth = <DP83867_PHYCR_FIFO_DEPTH_4_B_NIB>;
-        ti,min-output-impedance;
-    };
-};
```

Reason: Network disabled, PHY not needed.

7: Remove Flash Subsystem (fss)

```
-&fss {
-    bootph-all;
-};
```

Reason: Not required for SD card boot.

8: Remove OSPI Flash Controller and All Partitions

```
-&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>;
-		cdns,tshsl-ns = <60>;
-		cdns,tsd2d-ns = <60>;
-		cdns,tchsh-ns = <60>;
-		cdns,tslch-ns = <60>;
-		cdns,read-delay = <4>;
-		cdns,phy-mode;
-
-		partitions {
-			bootph-all;
-			compatible = "fixed-partitions";
-			#address-cells = <1>;
-			#size-cells = <1>;
-
-			partition@0 {
-				label = "ospi.tiboot3";
-				reg = <0x0 0x80000>;
-			};
-
-			partition@80000 {
-				label = "ospi.tispl";
-				reg = <0x80000 0x200000>;
-			};
-
-			partition@280000 {
-				label = "ospi.u-boot";
-				reg = <0x280000 0x400000>;
-			};
-
-			partition@680000 {
-				label = "ospi.env";
-				reg = <0x680000 0x40000>;
-			};
-
-			partition@6c0000 {
-				label = "ospi.env.backup";
-				reg = <0x6c0000 0x40000>;
-			};
-
-			partition@800000 {
-				label = "ospi.rootfs";
-				reg = <0x800000 0x37c0000>;
-			};
-
```

```
-            partition@3fc0000 {
-                bootph-pre-ram;
-                label = "ospi.phypattern";
-                reg = <0x3fc0000 0x40000>;
-            };
-        };
-    };
-};
```

Reason: OSPI flash not required. Booting from SD card.

9: Remove Audio Codec Supply

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

Reason: Audio subsystem disabled.

10: Remove Time Synchronization Router

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

Reason: Not required for basic operation.

File 2: arch/arm64/boot/dts/ti/k3-am62x-sk-common.dtsi

1: Remove Simple Framebuffer
```

```
-       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 output not required for boot.

2: Remove Ramoops (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 minimal boot.

3: Remove RTOS IPC Memory Region

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

Reason: Inter-processor communication not required for minimal boot.

4: Remove LED Subsystem

```
-    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: Remove Audio Clock

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

Reason: Audio subsystem disabled.

6: Remove Audio Card (codec_audio)

```
-    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";
-        simple-audio-card,routing =
-            "Headphone Jack",   "HPLOUT",
-            "Headphone Jack",   "HPROUT",
-            "LINE1L",        "Line In",
```

```
-                    "LINE1R",            "Line In",
-                    "MIC3R",             "Microphone Jack",
-                    "Microphone Jack",   "Mic Bias";
-          simple-audio-card,format = "dsp_b";
-          simple-audio-card,bitclock-master = <&sound_master>;
-          simple-audio-card,frame-master = <&sound_master>;
-          simple-audio-card,bitclock-inversion;
-
-          simple-audio-card,cpu {
-              sound-dai = <&mcasp1>;
-          };
-
-          sound_master: simple-audio-card,codec {
-              sound-dai = <&tlv320aic3106>;
-              clocks = <&tlv320_mclk>;
-          };
-      };
```

Reason: Audio functionality disabled.

7: Remove PHY GMII Selector Boot Phase

```
-&phy_gmii_sel {
-    bootph-all;
-};
```

Reason: Ethernet disabled, PHY selector unnecessary.

8: Remove CPSW MAC Syscon Boot Phase

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

Reason: Ethernet disabled, MAC control unnecessary.

9: Remove I2C Bus 2 (main_i2c2)

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

Reason: Peripheral bus not required for booting.

10: Remove Ethernet Switch Main Configuration (cpsw3g)

```
-&cpsw3g {
-    bootph-all;
-    pinctrl-names = "default";
-    pinctrl-0 = <&main_rgmii1_pins_default>;
-};
```

Reason: Ethernet disabled for minimal configuration.

11: Remove Ethernet Port 1 (cpsw_port1)

```
-&cpsw_port1 {
-    bootph-all;
-    phy-mode = "rgmii-rxid";
-    phy-handle = <&cpsw3g_phy0>;
-};
```

Reason: Ethernet port disabled.

12: Remove MDIO Bus and PHY (cpsw3g_mdio, cpsw3g_phy0)

```
-&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_RGMIIDCTL_2_00_NS>;
-        ti,fifo-depth = <DP83867_PHYCR_FIFO_DEPTH_4_B_NIB>;
-        ti,min-output-impedance;
-    };
-};
```

Reason: Ethernet disabled, MDIO/PHY unnecessary.

13: Remove McASP1 (Audio Interface)

```
-&mcasp1 {
-    status = "okay";
-    #sound-dai-cells = <0>;
-
-    pinctrl-names = "default";
-    pinctrl-0 = <&main_mcasp1_pins_default>;
-
-    op-mode = <0>;            /* MCASP_IIS_MODE */
-    tdm-slots = <2>;
-
-    serial-dir = <  /* 0: INACTIVE, 1: TX, 2: RX */
-           1 0 2 0
-           0 0 0 0
-           0 0 0 0
-           0 0 0 0
-    >;
-};
```

Reason: Audio interface disabled.

14: Remove DSS OLDI IO Control Boot Phase

```
-&dss_oldi_io_ctrl {
-    bootph-all;
-};
```

Reason: Display disabled, I/O control not needed.

15: Remove Display Subsystem (dss)

```
-&dss {
-    bootph-all;
-    status = "okay";
-    pinctrl-names = "default";
-    pinctrl-0 = <&main_dss0_pins_default>;
-};
```

Reason: Display not required for minimal boot.

16: Remove OSPI Flash Configuration

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

Reason: Flash controller not required for SD boot.

17: Remove PRU-ICSS UART

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

Reason: PRU UART not required for minimal boot.