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## SDMMC device tree configuration



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## 1 Article purpose

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This article explains how to configure the **SDMMC** internal peripheral when it is assigned to the Linux<sup>®</sup>OS. In that case, it is controlled by the **MMC** framework.

The configuration is performed using the **device tree** mechanism that provides a hardware description of the SDMMC peripheral, used by the STM32 SDMMC Linux driver and by the MMC framework.



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## 2 DT bindings documentation

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The SDMMC device tree bindings are composed of:

- generic MMC device tree bindings <sup>[1]</sup>.
- SDMMC MMC/SD/SDIO interface bindings <sup>[2]</sup>.



### 3 DT configuration

This hardware description is a combination of the **STM32 microprocessor** device tree files (*.dtsi* extension) and **board** device tree files (*.dts* extension). See the [Device tree](#) for an explanation of the device tree file split.

**STM32CubeMX** can be used to generate the board device tree. Refer to [How to configure the DT using STM32CubeMX](#) for more details.

#### 3.1 DT configuration (STM32 level)

The SDMMC peripheral node is located in *stm32mp157c.dtsi*<sup>[3]</sup> file.

<pre>sdmmc1: sdmmc@58005000 {     compatible = "arm,pl18x", "arm,primecell";     arm,primecell-periphid = &lt;0x00253180&gt;;     reg = &lt;0x58005000 0x1000&gt;,         &lt;0x58006000 0x1000&gt;;     interrupts = &lt;GIC_SPI 49 IRQ_TYPE_LEVEL_HIGH&gt;;     interrupt-names = "cmd_irq";     clocks = &lt;&amp;rcc SDMMC1_K&gt;;     clock-names = apb_pclk;     resets = &lt;&amp;rcc SDMMC1_R&gt;;     status = "disabled"; };</pre>	<p><b>Comments</b></p> <p>--&gt; The controller register</p> <p>--&gt; The delay block register</p> <p>--&gt; The interrupt number used</p>
---	---



**This device tree part is related to STM32 microprocessors. It should be kept as is, without being modified by the end-user.**

#### 3.2 DT configuration (board level)

The SDMMC peripheral may connect to one SD card, one eMMC™ device or one SDIO card.

<pre>&amp;sdmmc1{     pinctrl-names = "default", "opendrain", "sleep";     pinctrl-0 = &lt;&amp;sdmmc1_b4_pins_a &amp;sdmmc1_dir_pins_a&gt;;     pinctrl-1 = &lt;&amp;sdmmc1_b4_od_pins_a &amp;sdmmc1_dir_pins_a&gt;;     pinctrl-2 = &lt;&amp;sdmmc1_b4_sleep_pins_a &amp;sdmmc1_dir_sleep_pins_a&gt;;     st,neg-edge;     st,sig-dir;     st,use-ckin;     bus-width = &lt;4&gt;; };</pre>	<p><b>Comments</b></p> <p>--&gt; For pinctrl configuration, please refer to <a href="#">Pinctrl device tree configuration</a></p> <p>--&gt; Generate data and command on sdmmc clock falling edge</p> <p>--&gt; Allow to select direction polarity of an external transceiver</p> <p>--&gt; Use sdmmc_ckin pin from an external transceiver to sample the receive data</p> <p>--&gt; Number of data lines, can be 1, 4 or 8</p>
---	---



```

power vmmc-supply = <&vdd_sd>;                                --> Supply node for card's
power vqmmc-supply = <&sd_switch>;                            --> Supply node for IO line
status = "okay";                                           --> Enable the node
};

```

Below optional properties have to be used when an external transceiver is connected:

- `st,sig-dir`: This property allows to select external transceiver direction signals polarity. When this property is set, the voltage transceiver IOs are driven as output when the direction signals are high. Without setting this property, the voltage transceiver IOs are driven as output when the direction signals are low.
- `st,use-ckin`: By setting this property, the `sdmmc_ckin` pin from an external transceiver is used to sample the receive data.

### 3.3 DT configuration examples

Below example shows how to configure the SDMMC when an eMMC™ is connected with 8 data lines <sup>[4]</sup>.

```

&sdmmc2{
    pinctrl-names = "default", "opendrain", "sleep";          Comments
    pinctrl-0 = <&sdmmc2_b4_pins_a &sdmmc2_dir_pins_a>;
    pinctrl-1 = <&sdmmc2_b4_od_pins_a &sdmmc2_dir_pins_a>;
    pinctrl-2 = <&sdmmc2_b4_sleep_pins_a &sdmmc2_dir_sleep_pins_a>;
    non-removable;                                           --> Non-removable slot,
    assume always present                                     --> Avoid to send SD command
    no-sd;                                                    --> Avoid to send SDIO
    during initialization                                     --> Avoid to send SDIO
    no-sdio;
    command during initialization
    st,neg-edge;
    bus-width = <8>;
    vmmc-supply = <&v3v3>;
    vqmmc-supply = <&vdd>;
    mmc-ddr-3_3v;                                           --> Host supports eMMC™ DDR
    3.3V
    status = "okay";
};

```

Below example shows how to configure the SDMMC to SD card (4 data lines) with an external transceiver <sup>[4]</sup>.

```

&sdmmc1{
    pinctrl-names = "default", "opendrain", "sleep";          Comments
    pinctrl-0 = <&sdmmc1_b4_pins_a &sdmmc1_dir_pins_a>;
    pinctrl-1 = <&sdmmc1_b4_od_pins_a &sdmmc1_dir_pins_a>;
    pinctrl-2 = <&sdmmc1_b4_sleep_pins_a &sdmmc1_dir_sleep_pins_a>;
    broken-cd;                                               --> use polling mode for
    card detection
    st,neg-edge;
    st,sig-dir;
    st,use-ckin;
    bus-width = <4>;
    sd-uhs-sdr12;                                           --> sd modes supported [1]
    sd-uhs-sdr25;
    sd-uhs-sdr50;
};

```



```
sd-uhs-ddr50;  
sd-uhs-sdr104;  
vmmc-supply = <&vdd_sd>;  
vqmmc-supply = <&sd_switch>;  
status = "okay";  
};
```





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## 4 How to configure the DT using STM32CubeMX

---

The STM32CubeMX tool can be used to configure the STM32MPU device and get the corresponding platform configuration device tree files.

The STM32CubeMX may not support all the properties described in the above DT bindings documentation paragraph. If so, the tool inserts **user sections** in the generated device tree. These sections can then be edited to add some properties and they are preserved from one generation to another. Refer to STM32CubeMX user manual for further information.



## 5 References

Please refer to the following links for additional information:

- 1.01.1 [Documentation/devicetree/bindings/mmc/mmc.txt](#)
- [Documentation/devicetree/bindings/mmc/mmci.txt](#)
- [arch/arm/boot/dts/stm32mp157c.dtsi](#)
- 4.04.1 [arch/arm/boot/dts/stm32mp157c-ed1.dts](#)

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## 1 Article purpose

---

This article explains how to configure the **SDMMC** internal peripheral when it is assigned to the Linux<sup>®</sup>OS. In that case, it is controlled by the **MMC** framework.

The configuration is performed using the **device tree** mechanism that provides a hardware description of the SDMMC peripheral, used by the STM32 SDMMC Linux driver and by the MMC framework.



## 2 DT bindings documentation

---

The SDMMC device tree bindings are composed of:

- generic MMC device tree bindings <sup>[1]</sup>.
- SDMMC MMC/SD/SDIO interface bindings <sup>[2]</sup>.



### 3 DT configuration

This hardware description is a combination of the **STM32 microprocessor** device tree files (*.dtsi* extension) and **board** device tree files (*.dts* extension). See the [Device tree](#) for an explanation of the device tree file split.

**STM32CubeMX** can be used to generate the board device tree. Refer to [How to configure the DT using STM32CubeMX](#) for more details.

#### 3.1 DT configuration (STM32 level)

The SDMMC peripheral node is located in *stm32mp157c.dtsi*<sup>[3]</sup> file.

<pre>sdmmc1: sdmmc@58005000 {     compatible = "arm,pl18x", "arm,primecell";     arm,primecell-periphid = &lt;0x00253180&gt;;     reg = &lt;0x58005000 0x1000&gt;,         &lt;0x58006000 0x1000&gt;;     interrupts = &lt;GIC_SPI 49 IRQ_TYPE_LEVEL_HIGH&gt;;     interrupt-names = "cmd_irq";     clocks = &lt;&amp;rcc SDMMC1_K&gt;;     clock-names = apb_pclk;     resets = &lt;&amp;rcc SDMMC1_R&gt;;     status = "disabled"; };</pre>	<p><b>Comments</b></p> <p>--&gt; The controller register</p> <p>--&gt; The delay block register</p> <p>--&gt; The interrupt number used</p>
---	---



**This device tree part is related to STM32 microprocessors. It should be kept as is, without being modified by the end-user.**

#### 3.2 DT configuration (board level)

The SDMMC peripheral may connect to one SD card, one eMMC™ device or one SDIO card.

<pre>&amp;sdmmc1{     pinctrl-names = "default", "opendrain", "sleep";     pinctrl-0 = &lt;&amp;sdmmc1_b4_pins_a &amp;sdmmc1_dir_pins_a&gt;;     pinctrl-1 = &lt;&amp;sdmmc1_b4_od_pins_a &amp;sdmmc1_dir_pins_a&gt;;     pinctrl-2 = &lt;&amp;sdmmc1_b4_sleep_pins_a &amp;sdmmc1_dir_sleep_pins_a&gt;;     st,neg-edge;     st,sig-dir;     st,use-ckin;     bus-width = &lt;4&gt;; };</pre>	<p><b>Comments</b></p> <p>--&gt; For pinctrl configuration, please refer to <a href="#">Pinctrl device tree configuration</a></p> <p>--&gt; Generate data and command on sdmmc clock falling edge</p> <p>--&gt; Allow to select direction polarity of an external transceiver</p> <p>--&gt; Use sdmmc_ckin pin from an external transceiver to sample the receive data</p> <p>--&gt; Number of data lines, can be 1, 4 or 8</p>
---	---



```

power vmmc-supply = <&vdd_sd>;                                --> Supply node for card's
power vqmmc-supply = <&sd_switch>;                            --> Supply node for IO line
status = "okay";                                           --> Enable the node
};

```

Below optional properties have to be used when an external transceiver is connected:

- `st,sig-dir`: This property allows to select external transceiver direction signals polarity. When this property is set, the voltage transceiver IOs are driven as output when the direction signals are high. Without setting this property, the voltage transceiver IOs are driven as output when the direction signals are low.
- `st,use-ckin`: By setting this property, the `sdmmc_ckin` pin from an external transceiver is used to sample the receive data.

### 3.3 DT configuration examples

Below example shows how to configure the SDMMC when an eMMC™ is connected with 8 data lines <sup>[4]</sup>.

```

&sdmmc2{
    pinctrl-names = "default", "opendrain", "sleep";          Comments
    pinctrl-0 = <&sdmmc2_b4_pins_a &sdmmc2_dir_pins_a>;
    pinctrl-1 = <&sdmmc2_b4_od_pins_a &sdmmc2_dir_pins_a>;
    pinctrl-2 = <&sdmmc2_b4_sleep_pins_a &sdmmc2_dir_sleep_pins_a>;
    non-removable;                                           --> Non-removable slot,
    assume always present                                     --> Avoid to send SD command
    no-sd;                                                    --> Avoid to send SDIO
    during initialization
    no-sdio;                                                 --> Avoid to send SDIO
    command during initialization
    st,neg-edge;
    bus-width = <8>;
    vmmc-supply = <&v3v3>;
    vqmmc-supply = <&vdd>;
    mmc-ddr-3_3v;                                           --> Host supports eMMC™ DDR
    3.3V
    status = "okay";
};

```

Below example shows how to configure the SDMMC to SD card (4 data lines) with an external transceiver <sup>[4]</sup>.

```

&sdmmc1{
    pinctrl-names = "default", "opendrain", "sleep";          Comments
    pinctrl-0 = <&sdmmc1_b4_pins_a &sdmmc1_dir_pins_a>;
    pinctrl-1 = <&sdmmc1_b4_od_pins_a &sdmmc1_dir_pins_a>;
    pinctrl-2 = <&sdmmc1_b4_sleep_pins_a &sdmmc1_dir_sleep_pins_a>;
    broken-cd;                                               --> use polling mode for
    card detection
    st,neg-edge;
    st,sig-dir;
    st,use-ckin;
    bus-width = <4>;
    sd-uhs-sdr12;                                           --> sd modes supported [1]
    sd-uhs-sdr25;
    sd-uhs-sdr50;
};

```



```
sd-uhs-ddr50;  
sd-uhs-sdr104;  
vmmc-supply = <&vdd_sd>;  
vqmmc-supply = <&sd_switch>;  
status = "okay";  
};
```



---

## 4 How to configure the DT using STM32CubeMX

---

The STM32CubeMX tool can be used to configure the STM32MPU device and get the corresponding platform configuration device tree files.

The STM32CubeMX may not support all the properties described in the above DT bindings documentation paragraph. If so, the tool inserts **user sections** in the generated device tree. These sections can then be edited to add some properties and they are preserved from one generation to another. Refer to STM32CubeMX user manual for further information.





## 5 References

Please refer to the following links for additional information:

- 1.01.1 [Documentation/devicetree/bindings/mmc/mmc.txt](#)
- [Documentation/devicetree/bindings/mmc/mmci.txt](#)
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- 4.04.1 [arch/arm/boot/dts/stm32mp157c-ed1.dts](#)

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## 1 Article purpose

---

This article explains how to configure the **SDMMC** internal peripheral when it is assigned to the Linux<sup>®</sup>OS. In that case, it is controlled by the **MMC** framework.

The configuration is performed using the **device tree** mechanism that provides a hardware description of the SDMMC peripheral, used by the STM32 SDMMC Linux driver and by the MMC framework.



---

## 2 DT bindings documentation

---

The SDMMC device tree bindings are composed of:

- generic MMC device tree bindings <sup>[1]</sup>.
- SDMMC MMC/SD/SDIO interface bindings <sup>[2]</sup>.



### 3 DT configuration

This hardware description is a combination of the **STM32 microprocessor** device tree files (*.dtsi* extension) and **board** device tree files (*.dts* extension). See the [Device tree](#) for an explanation of the device tree file split.

**STM32CubeMX** can be used to generate the board device tree. Refer to [How to configure the DT using STM32CubeMX](#) for more details.

#### 3.1 DT configuration (STM32 level)

The SDMMC peripheral node is located in *stm32mp157c.dtsi*<sup>[3]</sup> file.

<pre>sdmmc1: sdmmc@58005000 {     compatible = "arm,pl18x", "arm,primecell";     arm,primecell-periphid = &lt;0x00253180&gt;;     reg = &lt;0x58005000 0x1000&gt;,         &lt;0x58006000 0x1000&gt;;     interrupts = &lt;GIC_SPI 49 IRQ_TYPE_LEVEL_HIGH&gt;;     interrupt-names = "cmd_irq";     clocks = &lt;&amp;rcc SDMMC1_K&gt;;     clock-names = apb_pclk;     resets = &lt;&amp;rcc SDMMC1_R&gt;;     status = "disabled"; };</pre>	<p><b>Comments</b></p> <p>--&gt; The controller register</p> <p>--&gt; The delay block register</p> <p>--&gt; The interrupt number used</p>
---	---



**This device tree part is related to STM32 microprocessors. It should be kept as is, without being modified by the end-user.**

#### 3.2 DT configuration (board level)

The SDMMC peripheral may connect to one SD card, one eMMC™ device or one SDIO card.

<pre>&amp;sdmmc1{     pinctrl-names = "default", "opendrain", "sleep";     pinctrl-0 = &lt;&amp;sdmmc1_b4_pins_a &amp;sdmmc1_dir_pins_a&gt;;     pinctrl-1 = &lt;&amp;sdmmc1_b4_od_pins_a &amp;sdmmc1_dir_pins_a&gt;;     pinctrl-2 = &lt;&amp;sdmmc1_b4_sleep_pins_a &amp;sdmmc1_dir_sleep_pins_a&gt;;     st,neg-edge;     st,sig-dir;     st,use-ckin;     bus-width = &lt;4&gt;; };</pre>	<p><b>Comments</b></p> <p>--&gt; For pinctrl configuration, please refer to <a href="#">Pinctrl device tree configuration</a></p> <p>--&gt; Generate data and command on sdmmc clock falling edge</p> <p>--&gt; Allow to select direction polarity of an external transceiver</p> <p>--&gt; Use sdmmc_ckin pin from an external transceiver to sample the receive data</p> <p>--&gt; Number of data lines, can be 1, 4 or 8</p>
---	---



```

power vmmc-supply = <&vdd_sd>;                                --> Supply node for card's
power vqmmc-supply = <&sd_switch>;                            --> Supply node for IO line
status = "okay";                                           --> Enable the node
};

```

Below optional properties have to be used when an external transceiver is connected:

- `st,sig-dir`: This property allows to select external transceiver direction signals polarity. When this property is set, the voltage transceiver IOs are driven as output when the direction signals are high. Without setting this property, the voltage transceiver IOs are driven as output when the direction signals are low.
- `st,use-ckin`: By setting this property, the `sdmmc_ckin` pin from an external transceiver is used to sample the receive data.

### 3.3 DT configuration examples

Below example shows how to configure the SDMMC when an eMMC™ is connected with 8 data lines <sup>[4]</sup>.

```

&sdmmc2{
    pinctrl-names = "default", "opendrain", "sleep";          Comments
    pinctrl-0 = <&sdmmc2_b4_pins_a &sdmmc2_dir_pins_a>;
    pinctrl-1 = <&sdmmc2_b4_od_pins_a &sdmmc2_dir_pins_a>;
    pinctrl-2 = <&sdmmc2_b4_sleep_pins_a &sdmmc2_dir_sleep_pins_a>;
    non-removable;                                           --> Non-removable slot,
    assume always present                                     --> Avoid to send SD command
    no-sd;                                                     --> Avoid to send SDIO
    during initialization                                     --> Avoid to send SDIO
    no-sdio;
    command during initialization
    st,neg-edge;
    bus-width = <8>;
    vmmc-supply = <&v3v3>;
    vqmmc-supply = <&vdd>;
    mmc-ddr-3_3v;                                           --> Host supports eMMC™ DDR
    3.3V
    status = "okay";
};

```

Below example shows how to configure the SDMMC to SD card (4 data lines) with an external transceiver <sup>[4]</sup>.

```

&sdmmc1{
    pinctrl-names = "default", "opendrain", "sleep";          Comments
    pinctrl-0 = <&sdmmc1_b4_pins_a &sdmmc1_dir_pins_a>;
    pinctrl-1 = <&sdmmc1_b4_od_pins_a &sdmmc1_dir_pins_a>;
    pinctrl-2 = <&sdmmc1_b4_sleep_pins_a &sdmmc1_dir_sleep_pins_a>;
    broken-cd;                                               --> use polling mode for
    card detection
    st,neg-edge;
    st,sig-dir;
    st,use-ckin;
    bus-width = <4>;
    sd-uhs-sdr12;                                           --> sd modes supported [1]
    sd-uhs-sdr25;
    sd-uhs-sdr50;
};

```



```
sd-uhs-ddr50;  
sd-uhs-sdr104;  
vmmc-supply = <&vdd_sd>;  
vqmmc-supply = <&sd_switch>;  
status = "okay";  
};
```



---

## 4 How to configure the DT using STM32CubeMX

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The STM32CubeMX tool can be used to configure the STM32MPU device and get the corresponding platform configuration device tree files.

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## 2 DT bindings documentation

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The SDMMC device tree bindings are composed of:

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### 3 DT configuration

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**STM32CubeMX** can be used to generate the board device tree. Refer to [How to configure the DT using STM32CubeMX](#) for more details.

#### 3.1 DT configuration (STM32 level)

The SDMMC peripheral node is located in *stm32mp157c.dtsi*<sup>[3]</sup> file.

<pre>sdmmc1: sdmmc@58005000 {     compatible = "arm,pl18x", "arm,primecell";     arm,primecell-periphid = &lt;0x00253180&gt;;     reg = &lt;0x58005000 0x1000&gt;,         &lt;0x58006000 0x1000&gt;;     interrupts = &lt;GIC_SPI 49 IRQ_TYPE_LEVEL_HIGH&gt;;     interrupt-names = "cmd_irq";     clocks = &lt;&amp;rcc SDMMC1_K&gt;;     clock-names = apb_pclk;     resets = &lt;&amp;rcc SDMMC1_R&gt;;     status = "disabled"; };</pre>	<p><b>Comments</b></p> <p>--&gt; The controller register</p> <p>--&gt; The delay block register</p> <p>--&gt; The interrupt number used</p>
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**This device tree part is related to STM32 microprocessors. It should be kept as is, without being modified by the end-user.**

#### 3.2 DT configuration (board level)

The SDMMC peripheral may connect to one SD card, one eMMC™ device or one SDIO card.

<pre>&amp;sdmmc1{     pinctrl-names = "default", "opendrain", "sleep";     pinctrl-0 = &lt;&amp;sdmmc1_b4_pins_a &amp;sdmmc1_dir_pins_a&gt;;     pinctrl-1 = &lt;&amp;sdmmc1_b4_od_pins_a &amp;sdmmc1_dir_pins_a&gt;;     pinctrl-2 = &lt;&amp;sdmmc1_b4_sleep_pins_a &amp;sdmmc1_dir_sleep_pins_a&gt;;     st,neg-edge;     st,sig-dir;     st,use-ckin;     bus-width = &lt;4&gt;; };</pre>	<p><b>Comments</b></p> <p>--&gt; For pinctrl configuration, please refer to <a href="#">Pinctrl device tree configuration</a></p> <p>--&gt; Generate data and command on sdmmc clock falling edge</p> <p>--&gt; Allow to select direction polarity of an external transceiver</p> <p>--&gt; Use sdmmc_ckin pin from an external transceiver to sample the receive data</p> <p>--&gt; Number of data lines, can be 1, 4 or 8</p>
---	---



```

power vmmc-supply = <&vdd_sd>;                                --> Supply node for card's
power vqmmc-supply = <&sd_switch>;                            --> Supply node for IO line
status = "okay";                                           --> Enable the node
};

```

Below optional properties have to be used when an external transceiver is connected:

- `st,sig-dir`: This property allows to select external transceiver direction signals polarity. When this property is set, the voltage transceiver IOs are driven as output when the direction signals are high. Without setting this property, the voltage transceiver IOs are driven as output when the direction signals are low.
- `st,use-ckin`: By setting this property, the `sdmmc_ckin` pin from an external transceiver is used to sample the receive data.

### 3.3 DT configuration examples

Below example shows how to configure the SDMMC when an eMMC™ is connected with 8 data lines <sup>[4]</sup>.

```

&sdmmc2{
    pinctrl-names = "default", "opendrain", "sleep";          Comments
    pinctrl-0 = <&sdmmc2_b4_pins_a &sdmmc2_dir_pins_a>;
    pinctrl-1 = <&sdmmc2_b4_od_pins_a &sdmmc2_dir_pins_a>;
    pinctrl-2 = <&sdmmc2_b4_sleep_pins_a &sdmmc2_dir_sleep_pins_a>;
    non-removable;                                           --> Non-removable slot,
    assume always present                                     --> Avoid to send SD command
    no-sd;                                                    --> Avoid to send SDIO
    during initialization
    no-sdio;                                                 --> Avoid to send SDIO
    command during initialization
    st,neg-edge;
    bus-width = <8>;
    vmmc-supply = <&v3v3>;
    vqmmc-supply = <&vdd>;
    mmc-ddr-3_3v;                                           --> Host supports eMMC™ DDR
    3.3V
    status = "okay";
};

```

Below example shows how to configure the SDMMC to SD card (4 data lines) with an external transceiver <sup>[4]</sup>.

```

&sdmmc1{
    pinctrl-names = "default", "opendrain", "sleep";          Comments
    pinctrl-0 = <&sdmmc1_b4_pins_a &sdmmc1_dir_pins_a>;
    pinctrl-1 = <&sdmmc1_b4_od_pins_a &sdmmc1_dir_pins_a>;
    pinctrl-2 = <&sdmmc1_b4_sleep_pins_a &sdmmc1_dir_sleep_pins_a>;
    broken-cd;                                               --> use polling mode for
    card detection
    st,neg-edge;
    st,sig-dir;
    st,use-ckin;
    bus-width = <4>;
    sd-uhs-sdr12;                                           --> sd modes supported [1]
    sd-uhs-sdr25;
    sd-uhs-sdr50;
};

```



```
sd-uhs-ddr50;  
sd-uhs-sdr104;  
vmmc-supply = <&vdd_sd>;  
vqmmc-supply = <&sd_switch>;  
status = "okay";  
};
```



---

## 4 How to configure the DT using STM32CubeMX

---

The STM32CubeMX tool can be used to configure the STM32MPU device and get the corresponding platform configuration device tree files.

The STM32CubeMX may not support all the properties described in the above DT bindings documentation paragraph. If so, the tool inserts **user sections** in the generated device tree. These sections can then be edited to add some properties and they are preserved from one generation to another. Refer to STM32CubeMX user manual for further information.



## 5 References

Please refer to the following links for additional information:

- 1.01.1 [Documentation/devicetree/bindings/mmc/mmc.txt](#)
- [Documentation/devicetree/bindings/mmc/mmci.txt](#)
- [arch/arm/boot/dts/stm32mp157c.dtsi](#)
- 4.04.1 [arch/arm/boot/dts/stm32mp157c-ed1.dts](#)

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## 1 Article purpose

---

This article explains how to configure the **SDMMC** internal peripheral when it is assigned to the Linux<sup>®</sup>OS. In that case, it is controlled by the **MMC** framework.

The configuration is performed using the **device tree** mechanism that provides a hardware description of the SDMMC peripheral, used by the STM32 SDMMC Linux driver and by the MMC framework.





---

## 2 DT bindings documentation

---

The SDMMC device tree bindings are composed of:

- generic MMC device tree bindings <sup>[1]</sup>.
- SDMMC MMC/SD/SDIO interface bindings <sup>[2]</sup>.



### 3 DT configuration

This hardware description is a combination of the **STM32 microprocessor** device tree files (*.dtsi* extension) and **board** device tree files (*.dts* extension). See the [Device tree](#) for an explanation of the device tree file split.

**STM32CubeMX** can be used to generate the board device tree. Refer to [How to configure the DT using STM32CubeMX](#) for more details.

#### 3.1 DT configuration (STM32 level)

The SDMMC peripheral node is located in *stm32mp157c.dtsi*<sup>[3]</sup> file.

<pre>sdmmc1: sdmmc@58005000 {     compatible = "arm,pl18x", "arm,primecell";     arm,primecell-periphid = &lt;0x00253180&gt;;     reg = &lt;0x58005000 0x1000&gt;,         &lt;0x58006000 0x1000&gt;;     interrupts = &lt;GIC_SPI 49 IRQ_TYPE_LEVEL_HIGH&gt;;     interrupt-names = "cmd_irq";     clocks = &lt;&amp;rcc SDMMC1_K&gt;;     clock-names = apb_pclk;     resets = &lt;&amp;rcc SDMMC1_R&gt;;     status = "disabled"; };</pre>	<p><b>Comments</b></p> <p>--&gt; The controller register</p> <p>--&gt; The delay block register</p> <p>--&gt; The interrupt number used</p>
---	---



**This device tree part is related to STM32 microprocessors. It should be kept as is, without being modified by the end-user.**

#### 3.2 DT configuration (board level)

The SDMMC peripheral may connect to one SD card, one eMMC™ device or one SDIO card.

<pre>&amp;sdmmc1{     pinctrl-names = "default", "opendrain", "sleep";     pinctrl-0 = &lt;&amp;sdmmc1_b4_pins_a &amp;sdmmc1_dir_pins_a&gt;;     pinctrl-1 = &lt;&amp;sdmmc1_b4_od_pins_a &amp;sdmmc1_dir_pins_a&gt;;     pinctrl-2 = &lt;&amp;sdmmc1_b4_sleep_pins_a &amp;sdmmc1_dir_sleep_pins_a&gt;;     st,neg-edge;     st,sig-dir;     st,use-ckin;     bus-width = &lt;4&gt;; };</pre>	<p><b>Comments</b></p> <p>--&gt; For pinctrl configuration, please refer to <a href="#">Pinctrl device tree configuration</a></p> <p>--&gt; Generate data and command on sdmmc clock falling edge</p> <p>--&gt; Allow to select direction polarity of an external transceiver</p> <p>--&gt; Use sdmmc_ckin pin from an external transceiver to sample the receive data</p> <p>--&gt; Number of data lines, can be 1, 4 or 8</p>
---	---



```

power vmmc-supply = <&vdd_sd>;                                --> Supply node for card's
power vqmmc-supply = <&sd_switch>;                            --> Supply node for IO line
status = "okay";                                           --> Enable the node
};

```

Below optional properties have to be used when an external transceiver is connected:

- `st,sig-dir`: This property allows to select external transceiver direction signals polarity. When this property is set, the voltage transceiver IOs are driven as output when the direction signals are high. Without setting this property, the voltage transceiver IOs are driven as output when the direction signals are low.
- `st,use-ckin`: By setting this property, the `sdmmc_ckin` pin from an external transceiver is used to sample the receive data.

### 3.3 DT configuration examples

Below example shows how to configure the SDMMC when an eMMC™ is connected with 8 data lines <sup>[4]</sup>.

```

&sdmmc2{
    pinctrl-names = "default", "opendrain", "sleep";          Comments
    pinctrl-0 = <&sdmmc2_b4_pins_a &sdmmc2_dir_pins_a>;
    pinctrl-1 = <&sdmmc2_b4_od_pins_a &sdmmc2_dir_pins_a>;
    pinctrl-2 = <&sdmmc2_b4_sleep_pins_a &sdmmc2_dir_sleep_pins_a>;
    non-removable;                                           --> Non-removable slot,
    assume always present                                     --> Avoid to send SD command
    no-sd;                                                    --> Avoid to send SDIO
    during initialization                                     --> Avoid to send SDIO
    no-sdio;
    command during initialization
    st,neg-edge;
    bus-width = <8>;
    vmmc-supply = <&v3v3>;
    vqmmc-supply = <&vdd>;
    mmc-ddr-3_3v;                                           --> Host supports eMMC™ DDR
    3.3V
    status = "okay";
};

```

Below example shows how to configure the SDMMC to SD card (4 data lines) with an external transceiver <sup>[4]</sup>.

```

&sdmmc1{
    pinctrl-names = "default", "opendrain", "sleep";          Comments
    pinctrl-0 = <&sdmmc1_b4_pins_a &sdmmc1_dir_pins_a>;
    pinctrl-1 = <&sdmmc1_b4_od_pins_a &sdmmc1_dir_pins_a>;
    pinctrl-2 = <&sdmmc1_b4_sleep_pins_a &sdmmc1_dir_sleep_pins_a>;
    broken-cd;                                               --> use polling mode for
    card detection
    st,neg-edge;
    st,sig-dir;
    st,use-ckin;
    bus-width = <4>;
    sd-uhs-sdr12;                                           --> sd modes supported [1]
    sd-uhs-sdr25;
    sd-uhs-sdr50;
};

```



```
sd-uhs-ddr50;  
sd-uhs-sdr104;  
vmmc-supply = <&vdd_sd>;  
vqmmc-supply = <&sd_switch>;  
status = "okay";  
};
```



---

## 4 How to configure the DT using STM32CubeMX

---

The STM32CubeMX tool can be used to configure the STM32MPU device and get the corresponding platform configuration device tree files.

The STM32CubeMX may not support all the properties described in the above DT bindings documentation paragraph. If so, the tool inserts **user sections** in the generated device tree. These sections can then be edited to add some properties and they are preserved from one generation to another. Refer to STM32CubeMX user manual for further information.



## 5 References

Please refer to the following links for additional information:

- 1.01.1 [Documentation/devicetree/bindings/mmc/mmc.txt](#)
- [Documentation/devicetree/bindings/mmc/mmci.txt](#)
- [arch/arm/boot/dts/stm32mp157c.dtsi](#)
- 4.04.1 [arch/arm/boot/dts/stm32mp157c-ed1.dts](#)

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Doubledata rate (memory domain)

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## 1 Article purpose

---

This article explains how to configure the **SDMMC** internal peripheral when it is assigned to the Linux<sup>®</sup>OS. In that case, it is controlled by the **MMC** framework.

The configuration is performed using the **device tree** mechanism that provides a hardware description of the SDMMC peripheral, used by the STM32 SDMMC Linux driver and by the MMC framework.



## 2 DT bindings documentation

---

The SDMMC device tree bindings are composed of:

- generic MMC device tree bindings <sup>[1]</sup>.
- SDMMC MMC/SD/SDIO interface bindings <sup>[2]</sup>.





### 3 DT configuration

This hardware description is a combination of the **STM32 microprocessor** device tree files (*.dtsi* extension) and **board** device tree files (*.dts* extension). See the [Device tree](#) for an explanation of the device tree file split.

**STM32CubeMX** can be used to generate the board device tree. Refer to [How to configure the DT using STM32CubeMX](#) for more details.

#### 3.1 DT configuration (STM32 level)

The SDMMC peripheral node is located in *stm32mp157c.dtsi*<sup>[3]</sup> file.

<pre>sdmmc1: sdmmc@58005000 {     compatible = "arm,pl18x", "arm,primecell";     arm,primecell-periphid = &lt;0x00253180&gt;;     reg = &lt;0x58005000 0x1000&gt;,         &lt;0x58006000 0x1000&gt;;     interrupts = &lt;GIC_SPI 49 IRQ_TYPE_LEVEL_HIGH&gt;;     interrupt-names = "cmd_irq";     clocks = &lt;&amp;rcc SDMMC1_K&gt;;     clock-names = apb_pclk;     resets = &lt;&amp;rcc SDMMC1_R&gt;;     status = "disabled"; };</pre>	<p><b>Comments</b></p> <p>--&gt; The controller register</p> <p>--&gt; The delay block register</p> <p>--&gt; The interrupt number used</p>
---	---



**This device tree part is related to STM32 microprocessors. It should be kept as is, without being modified by the end-user.**

#### 3.2 DT configuration (board level)

The SDMMC peripheral may connect to one SD card, one eMMC™ device or one SDIO card.

<pre>&amp;sdmmc1{     pinctrl-names = "default", "opendrain", "sleep";     pinctrl-0 = &lt;&amp;sdmmc1_b4_pins_a &amp;sdmmc1_dir_pins_a&gt;;     pinctrl-1 = &lt;&amp;sdmmc1_b4_od_pins_a &amp;sdmmc1_dir_pins_a&gt;;     pinctrl-2 = &lt;&amp;sdmmc1_b4_sleep_pins_a &amp;sdmmc1_dir_sleep_pins_a&gt;;     st,neg-edge;     st,sig-dir;     st,use-ckin;     bus-width = &lt;4&gt;; };</pre>	<p><b>Comments</b></p> <p>--&gt; For pinctrl configuration, please refer to <a href="#">Pinctrl device tree configuration</a></p> <p>--&gt; Generate data and command on sdmmc clock falling edge</p> <p>--&gt; Allow to select direction polarity of an external transceiver</p> <p>--&gt; Use sdmmc_ckin pin from an external transceiver to sample the receive data</p> <p>--&gt; Number of data lines, can be 1, 4 or 8</p>
---	---



```

power vmmc-supply = <&vdd_sd>;                                --> Supply node for card's
power vqmmc-supply = <&sd_switch>;                            --> Supply node for IO line
status = "okay";                                           --> Enable the node
};

```

Below optional properties have to be used when an external transceiver is connected:

- `st,sig-dir`: This property allows to select external transceiver direction signals polarity. When this property is set, the voltage transceiver IOs are driven as output when the direction signals are high. Without setting this property, the voltage transceiver IOs are driven as output when the direction signals are low.
- `st,use-ckin`: By setting this property, the `sdmmc_ckin` pin from an external transceiver is used to sample the receive data.

### 3.3 DT configuration examples

Below example shows how to configure the SDMMC when an eMMC™ is connected with 8 data lines <sup>[4]</sup>.

```

&sdmmc2{
    pinctrl-names = "default", "opendrain", "sleep";          Comments
    pinctrl-0 = <&sdmmc2_b4_pins_a &sdmmc2_dir_pins_a>;
    pinctrl-1 = <&sdmmc2_b4_od_pins_a &sdmmc2_dir_pins_a>;
    pinctrl-2 = <&sdmmc2_b4_sleep_pins_a &sdmmc2_dir_sleep_pins_a>;
    non-removable;                                          --> Non-removable slot,
    assume always present                                    --> Avoid to send SD command
    no-sd;                                                  --> Avoid to send SDIO
    during initialization
    no-sdio;                                               --> Avoid to send SDIO
    command during initialization
    st,neg-edge;
    bus-width = <8>;
    vmmc-supply = <&v3v3>;
    vqmmc-supply = <&vdd>;
    mmc-ddr-3_3v;                                          --> Host supports eMMC™ DDR
    3.3V
    status = "okay";
};

```

Below example shows how to configure the SDMMC to SD card (4 data lines) with an external transceiver <sup>[4]</sup>.

```

&sdmmc1{
    pinctrl-names = "default", "opendrain", "sleep";          Comments
    pinctrl-0 = <&sdmmc1_b4_pins_a &sdmmc1_dir_pins_a>;
    pinctrl-1 = <&sdmmc1_b4_od_pins_a &sdmmc1_dir_pins_a>;
    pinctrl-2 = <&sdmmc1_b4_sleep_pins_a &sdmmc1_dir_sleep_pins_a>;
    broken-cd;                                             --> use polling mode for
    card detection
    st,neg-edge;
    st,sig-dir;
    st,use-ckin;
    bus-width = <4>;
    sd-uhs-sdr12;                                          --> sd modes supported [1]
    sd-uhs-sdr25;
    sd-uhs-sdr50;
};

```



```
sd-uhs-ddr50;  
sd-uhs-sdr104;  
vmmc-supply = <&vdd_sd>;  
vqmmc-supply = <&sd_switch>;  
status = "okay";  
};
```



---

## 4 How to configure the DT using STM32CubeMX

---

The STM32CubeMX tool can be used to configure the STM32MPU device and get the corresponding platform configuration device tree files.

The STM32CubeMX may not support all the properties described in the above DT bindings documentation paragraph. If so, the tool inserts **user sections** in the generated device tree. These sections can then be edited to add some properties and they are preserved from one generation to another. Refer to STM32CubeMX user manual for further information.



---

## 5 References

---

Please refer to the following links for additional information:

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- [Documentation/devicetree/bindings/mmc/mmci.txt](#)
- [arch/arm/boot/dts/stm32mp157c.dtsi](#)
- 4.04.1 [arch/arm/boot/dts/stm32mp157c-ed1.dts](#)

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