



RETRAM internal memory



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<noinclude> {{ArticleBasedOnModel | [[Internal peripheral article model]]}} {{ArticleMainWriter | GeraldB}}
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29aug'18 - 8334 | 4Sep'18}} [[Category:RAM interfaces]] {{ReviewsComments|JCT 1840: alignment needed with
the last version of the model [[Internal peripheral article model]]<br> [[Category:ToBeAlignedWithModel]] }} <
/noinclude> ==Peripheral overview== The "RETRAM" internal memory is 64 Kbytes wide and is physically near to
the Arm<sup>&reg;</sup> Cortex<sup>&reg;</sup>-M4 for optimized performance from the core. It is located in
the VSW power domain, allowing it to be supplied during Standby [[Power overview|low power mode]], and to
retain retention firmware that can be executed very quickly by the Cortex-M4 on wake up from Standby mode.
===Features=== Refer to [[STM32MP15 resources#Reference manuals|STM32MP15 reference manuals]] for the
complete feature list, and to the software components introduced below to see which features are actually
implemented.<br> ===Security support=== The RETRAM is a "secure" peripheral (under
[[ETZPC_internal_peripheral|ETZPC]] control). ==Peripheral usage and associated software== ===Boot time===
[[Linux remoteproc framework overview|Linux<sup>&reg;</sup> remoteproc framework]] (running on the Cortex-
A7) loads the Cortex-M4 firmware to the RETRAM, starting at address 0x00000000. At least, it must load the part
of the firmware containing the vector table, since the Cortex-M4 reset entry point is address 0x00000004. The rest
of the firmware code is loaded into the [[MCU SRAM internal memory|MCU SRAM]]. The overall memory mapping
is shown in the platform [[STM32MP15_RAM_mapping#Zoom in the Cortex-A7/Cortex-M4 shared memory
|memory mapping]] section. ===Runtime=== =====Overview===== The Cortex-M4 vector table is mapped from
address 0x00000000 (so to the RETRAM) at reset, but it can be remapped by software to any other location by
means of the vector table offset register (VTOR). Beyond the reset entry point (0x00000004), the exception table
also contains the software entries table used by the [[NVIC internal peripheral|NVIC]] to branch the software
execution to the right interrupt service routine.<br /> <br /> While going to Standby [[Power overview|low power
mode]], the RETRAM can remain supplied, so it can preserve a (small) Cortex-M4 piece of retention firmware that
is executed on wake up when the [[STM32MP15 ROM code overview|ROM code]] (running on Cortex-A7) restarts
the Cortex-M4. <br> All these constraints make the RETRAM the minimum (and default) choice for Cortex-M4
firmware. <br> RETRAM can be allocated to: * the Cortex-A7 secure to be used under [[OP-TEE overview|OP-
TEE]]. or * the Cortex-A7 non-secure to be used under Linux as [[Reserved memory|reserved memory]]. or * the
Cortex-M4 for use with the STM32Cube MPU Package, either for "runtime firmware" that ca be mapped in both
RETRAM and [[MCU SRAM internal memory|MCU SRAM]], or for "retention firmware" that only fits into the
RETRAM, but could have some data in [[MCU SRAM internal memory|MCU SRAM]] (keeping in mind that these
data are lost while entering Standby [[Power overview|low power mode]]). =====Software frameworks=====
{{:Internal_peripherals_software_table_template}} | Core/RAM | [[RETRAM internal memory|RETRAM]] | [[OP-
TEE_overview|OP-TEE overview]] | [[Reserved memory|Linux reserved memory]] | [[STM32CubeMP1
architecture|STM32Cube]] | |- } =====Peripheral configuration===== The configuration is applied by the firmware
running in the context to which the peripheral is assigned. The configuration can be done alone via the
[[STM32CubeMX]] tool for all internal peripherals, and then manually completed (especially for external
peripherals), according to the information given in the corresponding software framework article. =====Peripheral
assignment===== {{:Internal_peripherals_assignment_table_template}} <onlyinclude> | rowspan="1" | Core/RAM |
rowspan="1" | [[RETRAM internal memory|RETRAM]] | RETRAM | <span title="assignable peripheral" style="font-
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peripheral" style="font-size:21px"></span> | Assignment (single choice) |- </onlyinclude> | }
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