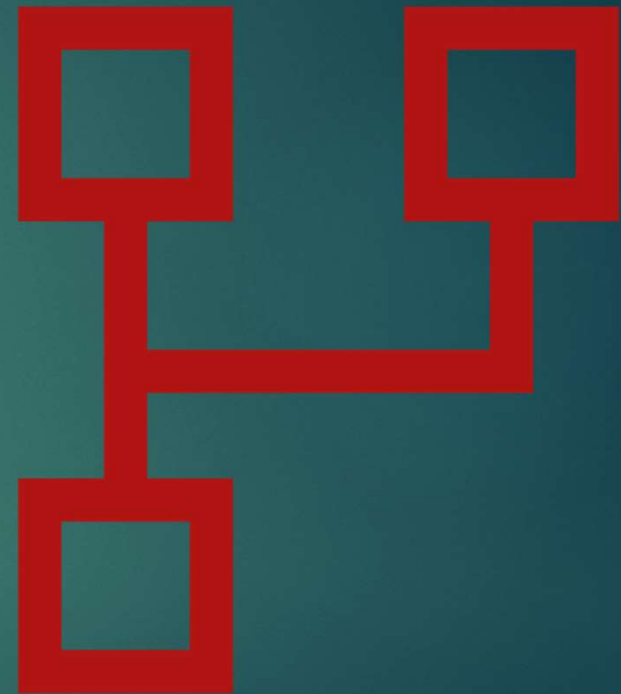




ARM M4 Memory System

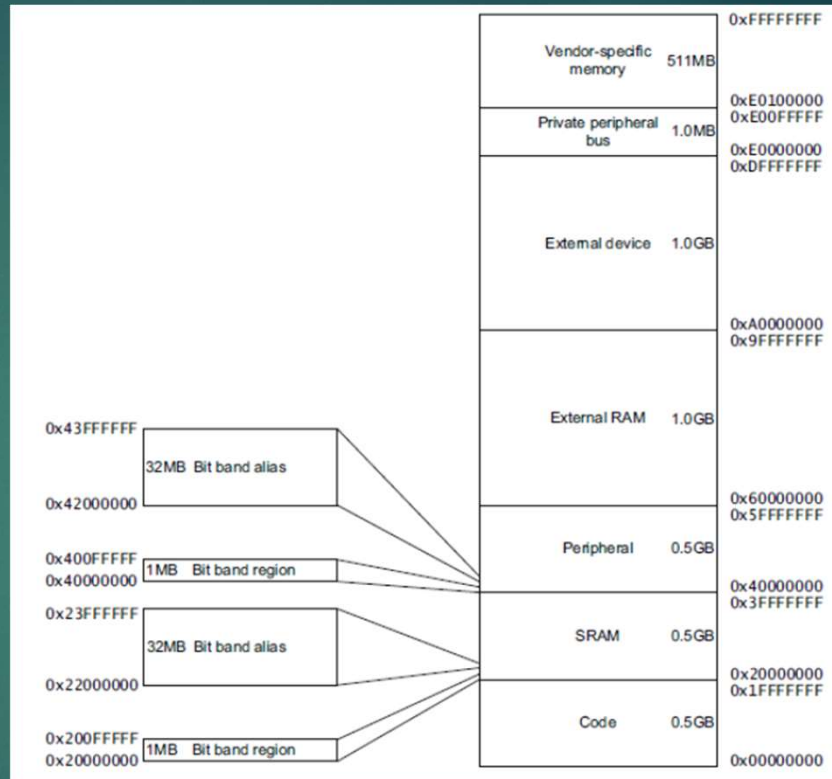
Features :

- All the Cortex-M processors have 32-bit memory addressing, as a result there is 4GB of addressable memory space.
- The memory is one unified space which is shared by code space, data space and peripheral space.
- Bit addressable memory spaces(bit-banding).
- MPU support(Optional).



Memory Mapping

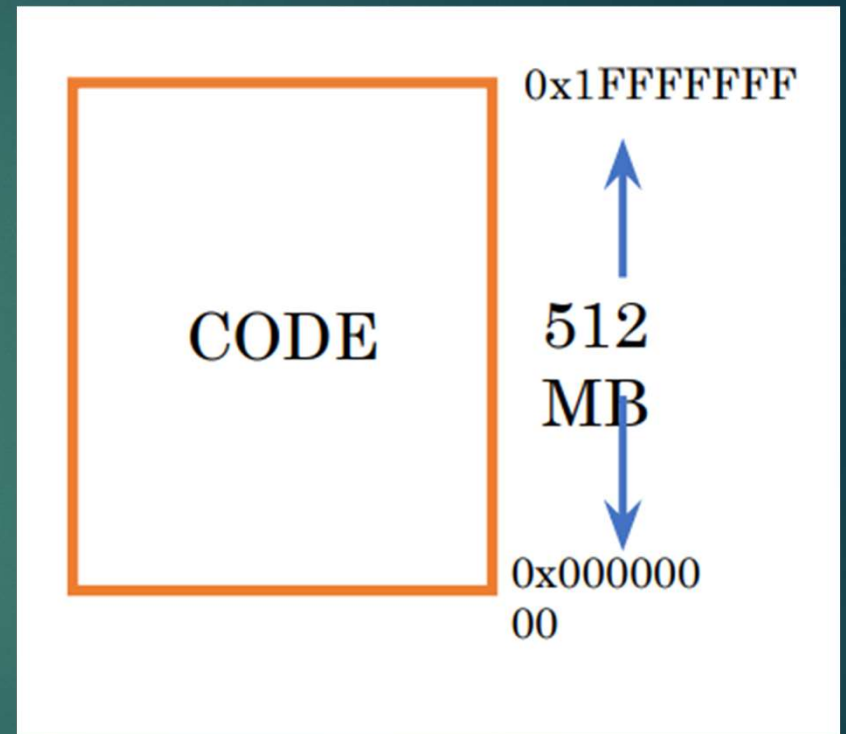
- The memory map shows what is included in each memory region.



Pre-defined memory map of the Cortex-M3 and Cortex-M4 processors

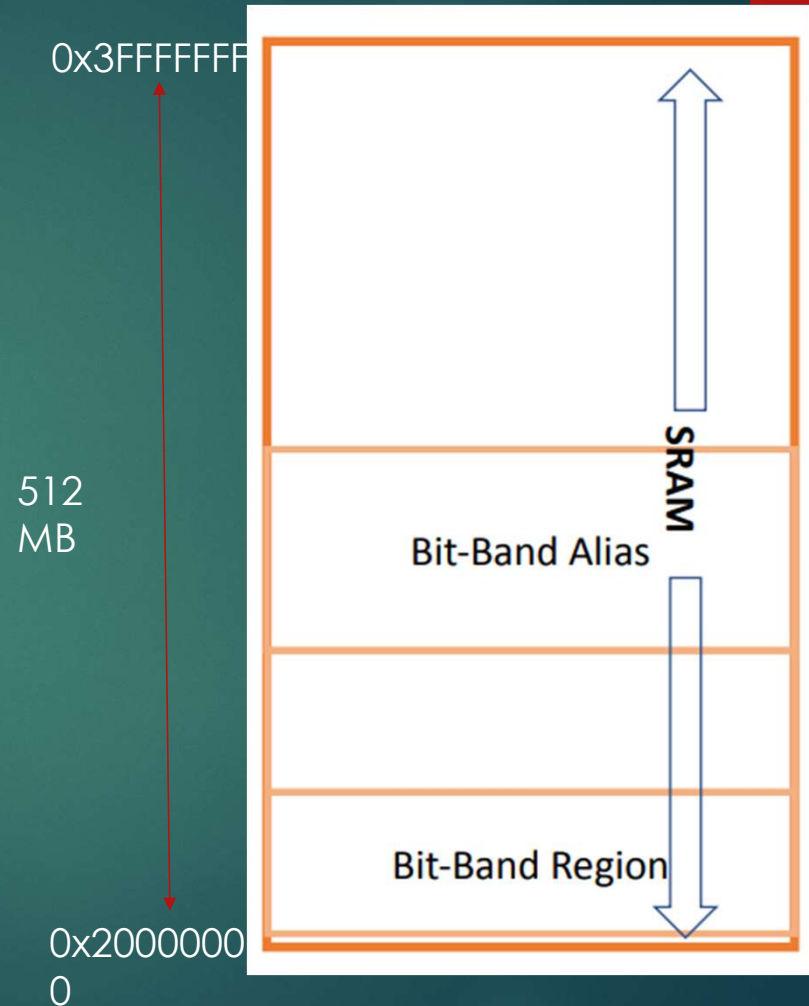
CODE Region

- This is the region where the MCU vendors should connect CODE memory.
- Processor by default fetches vector table information from this region right after reset.



SRAM Region

- The SRAM(Static-RAM) region is in the next 512 MB of memory space after the CODE region.
- It is primarily for connecting SRAM, mostly on-chip SRAM.
- The first 1 MB of the SRAM region is a bit addressable.



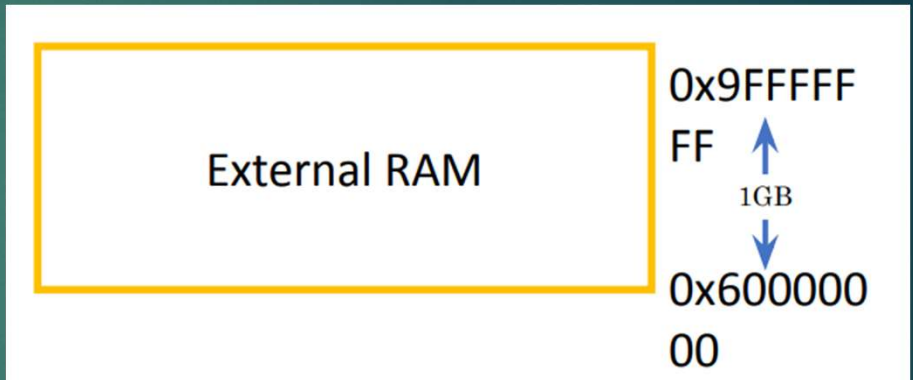
Peripherals Region



- The peripheral memory region also has the size of 512MB.
- Used mostly for on-chip peripherals.
- Like the SRAM region, the first 1MB of the peripheral region is bit addressable if the optional bit-band feature is included.
- This is an execute Never (XN) region .
- Trying to execute code from this region will trigger fault exception .

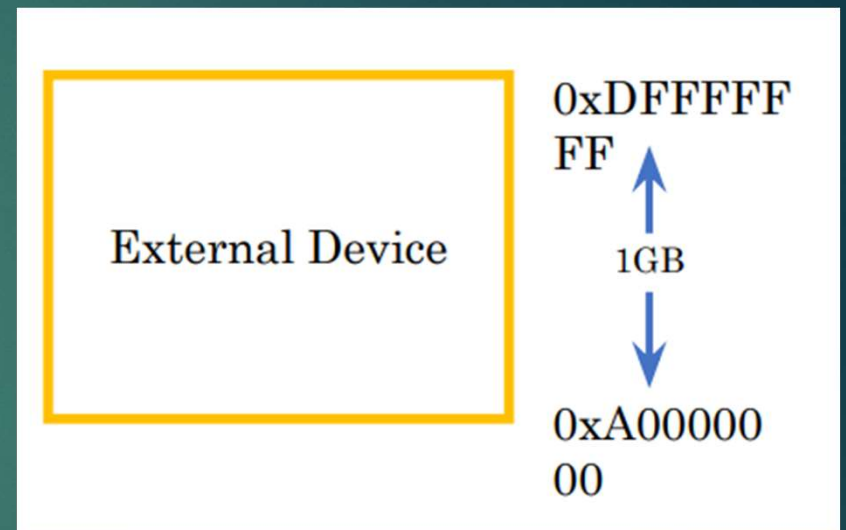
External RAM Region

- This region is intended for either on-chip or off-chip memory.
- you can execute code in this region.
- E.g., connecting external SDRAM.



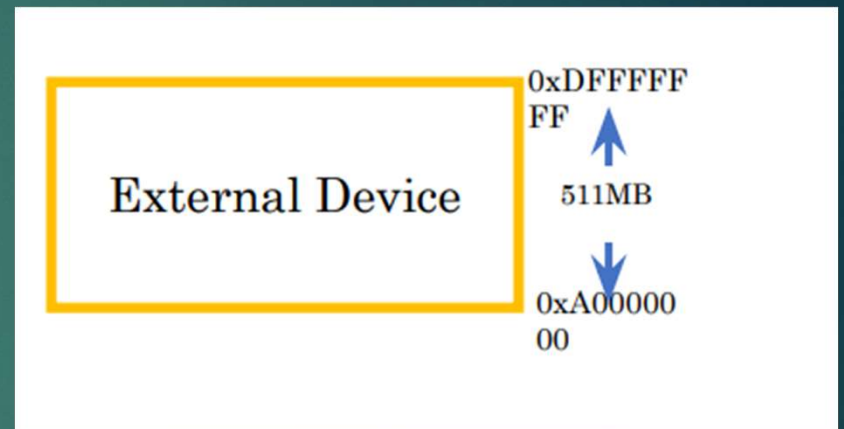
External Device Region

- This region is intended for external devices and/or shared memory.
- This is a execute Never (XN) region.



Private Peripheral Bus Region(Vendor Specific)

- This region includes the NVIC, System timer, and system control block.
- This is a execute Never (XN) region.



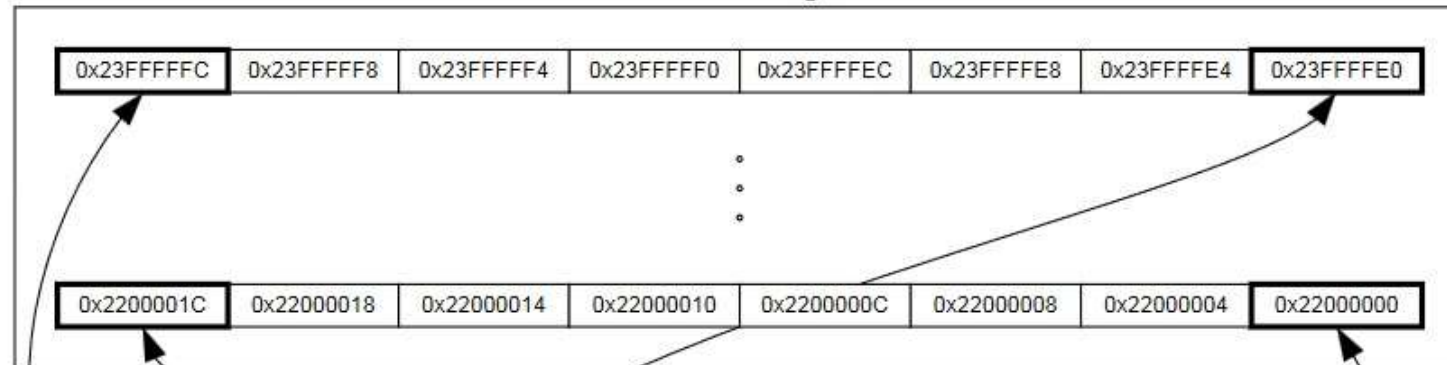
Bit Banding :

- Bit banding is the capability to address a single bit of a memory address.
- This feature is optional. i.e., MCU manufacturer supports it or many not support this feature. Refer to the reference manual

Formula :

Alias address = alias_base + (32 * (bit_band_memory_addr - bit_band_base)) + bit * 4

32MB alias region



1MB SRAM bit-band region

