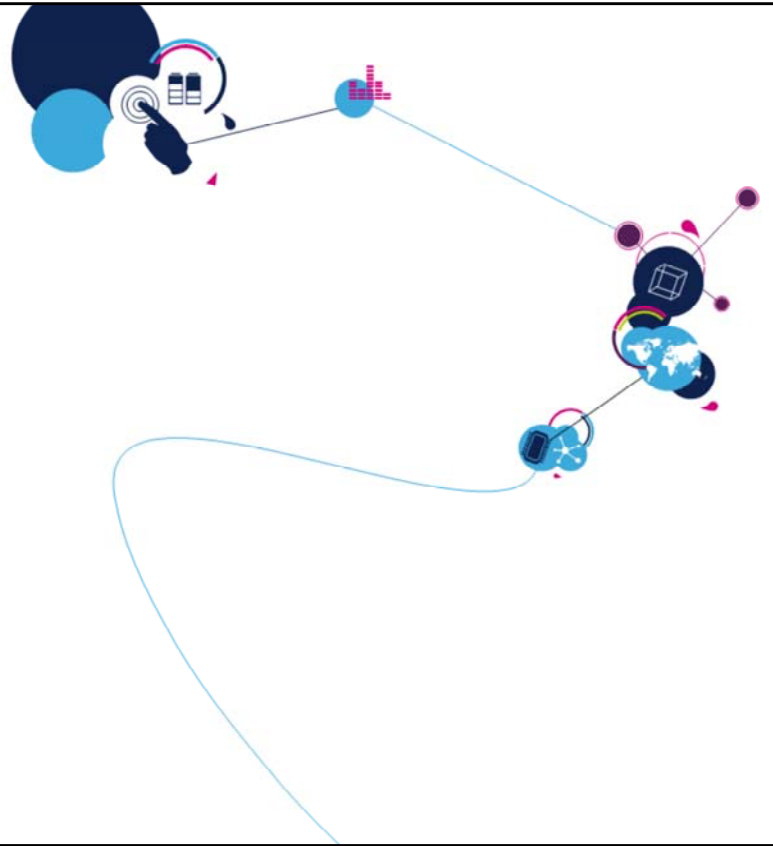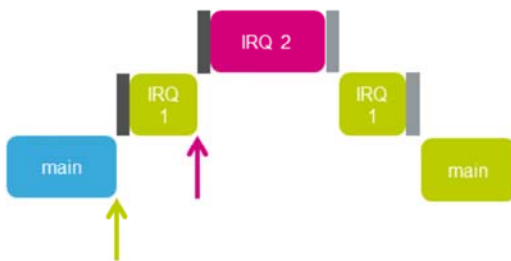# STM32F7 - EXTI

Extended interrupts and events controller

Revision 1.0

Hello, and welcome to this presentation that covers the features of the STM32 extended interrupts and events controller.

- Up to 25 events / interrupt lines
  - 16 lines dedicated to external GPIOs
  - 9 internal lines

- Independent masks and configuration


Application benefits
- Manages external and internal events / interrupts
- Generates wake-up requests to the processor

The EXTI controller provides up to 40 independent lines, split into two categories – configurable lines and direct lines.

The applications can benefit through smarter use of low-power modes, taking advantage of the capability to wake up via external communication or requests.

- Wake-up from Sleep and Stop modes, interrupts and events generation

- Configurable lines
  - Active edge selection
  - Dedicated status flag
  - Trigger-able by software
  - Linked to:
    - GPIO, PVD, RTC, LPTIM, ...
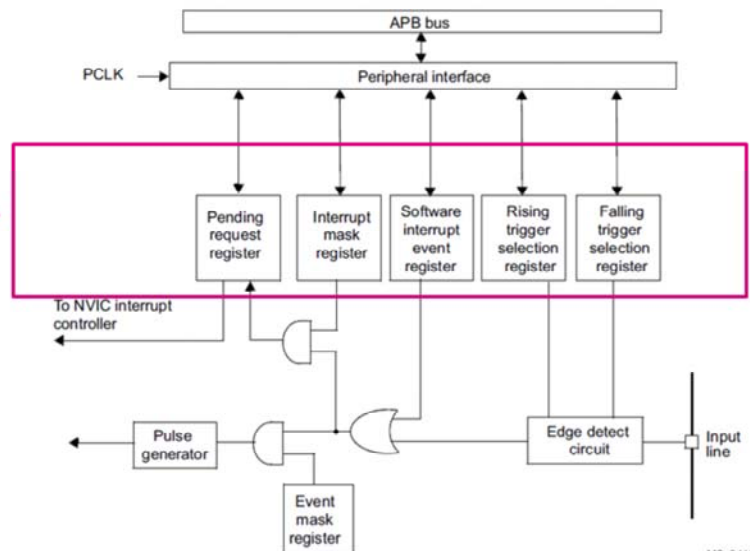
The EXTI controller provides interrupt and event generation, as well as the capability to wake up the processor from Sleep and Stop modes.
Configurable lines allow the user to select which active edge generates interrupts or events, with a dedicated status flag for each line. Requests on configurable lines can also be generated by software. Configurable lines are linked with external interrupts from general-purpose input/outputs, programmable voltage detector, real-time clock and low-power timer. These lines can wake up the processor from Sleep and Stop modes.
Internal lines provide possibility to wake up from Sleep or Stop modes on internal peripheral events, with status flags provided by related peripherals. They are linked mainly with peripherals working in Sleep or Stop modes.

Low-power modes

- Configurable lines can wake up the processor from Sleep and Stop modes.
    - General-purpose input/outputs (GPIOs)
    - Programmable voltage detector (PVD)
    - Real-time clock (RTC)
    - Low-power timer (LPTIM)
    - USB on-the-go full-speed interface (USB OTG FS)
    - USB on-the-go high-speed interface (USB OTG HS)
    - Ethernet wakeup,
    - Management data input/output (MDIO) slave

As mentioned on the previous slide, configurable lines can act as a wake-up source from Sleep and Stop modes. They provide the capability to wake up from a GPIO rising or falling edge, programmable voltage detector, real-time clock, low-power timer....

EXTI hardware workflow
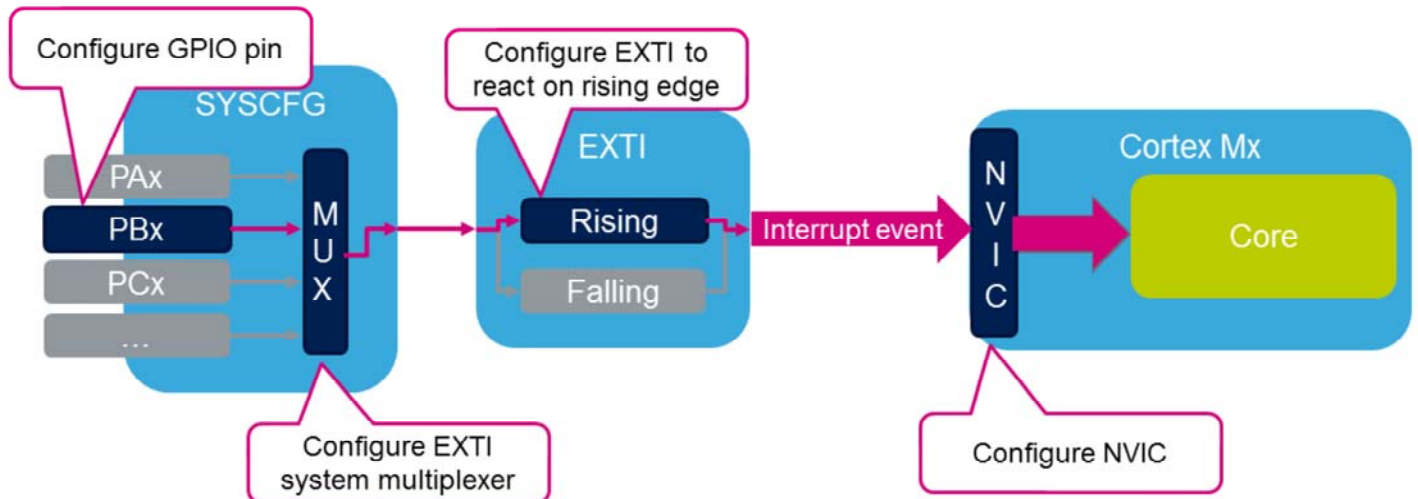
This slide describes the EXTI Hardware workflow.

To initialize a GPIO to generate an interrupt to wake up the processor from sleep mode for example, 4 main blocks need to be configured.

First of all, the GPIOs need to be configured in input mode.

As a second step, in the system configuration controller, the GPIO pin needs to be connected as an input to the EXTI controller line. The connection of the GPIO pin to the EXTI line is selected thru the EXTI system multiplexer.

The third step consists in enabling the adequate edge detector for the EXTI line. The EXTI controller is capable of generating an interrupt on a rising edge, falling edge or both edges on EXTI line transition.

Last step involves enabling the interrupt line in the CPU nested vectored interrupt controller (NVIC) to generate

an interrupt as soon as the EXTI controller raises its interrupt event.