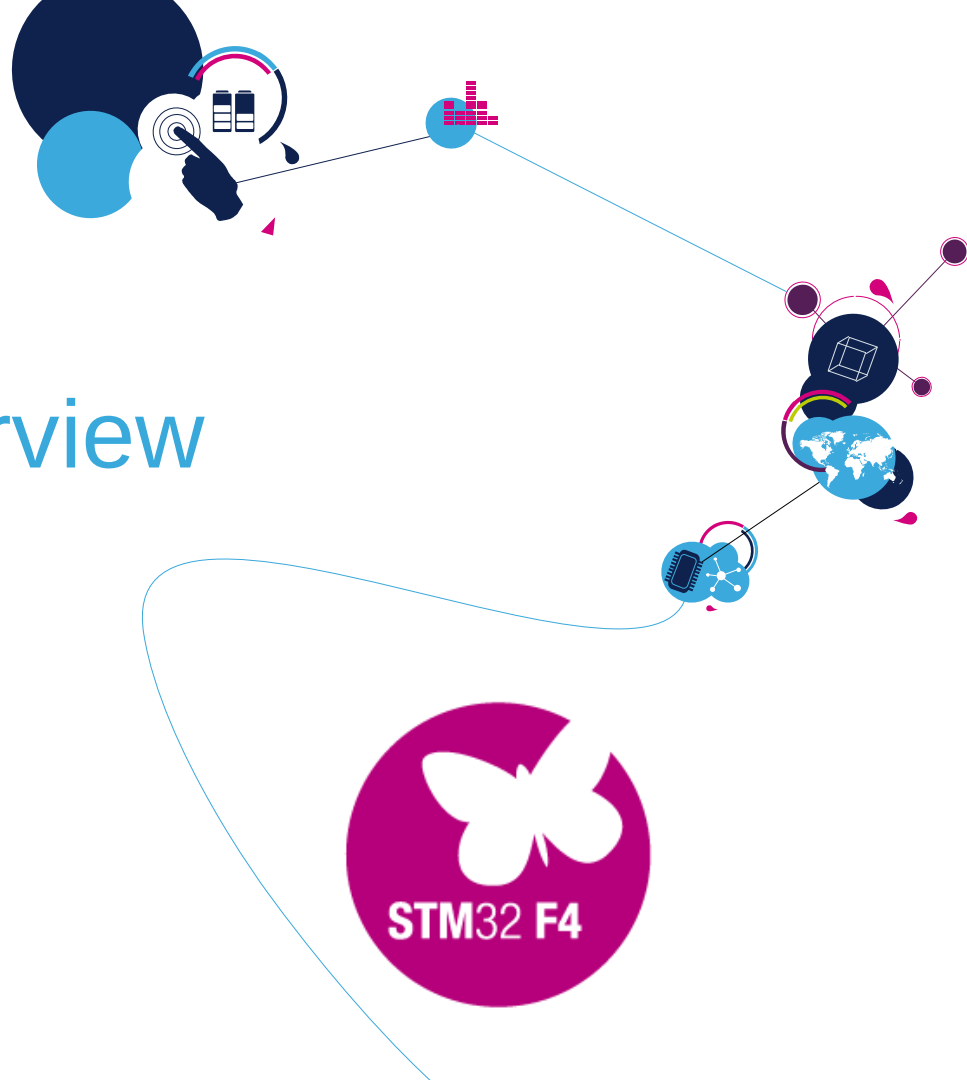


STM32F429 Overview

Steve Miller

STMicroelectronics, MMS Applications Team

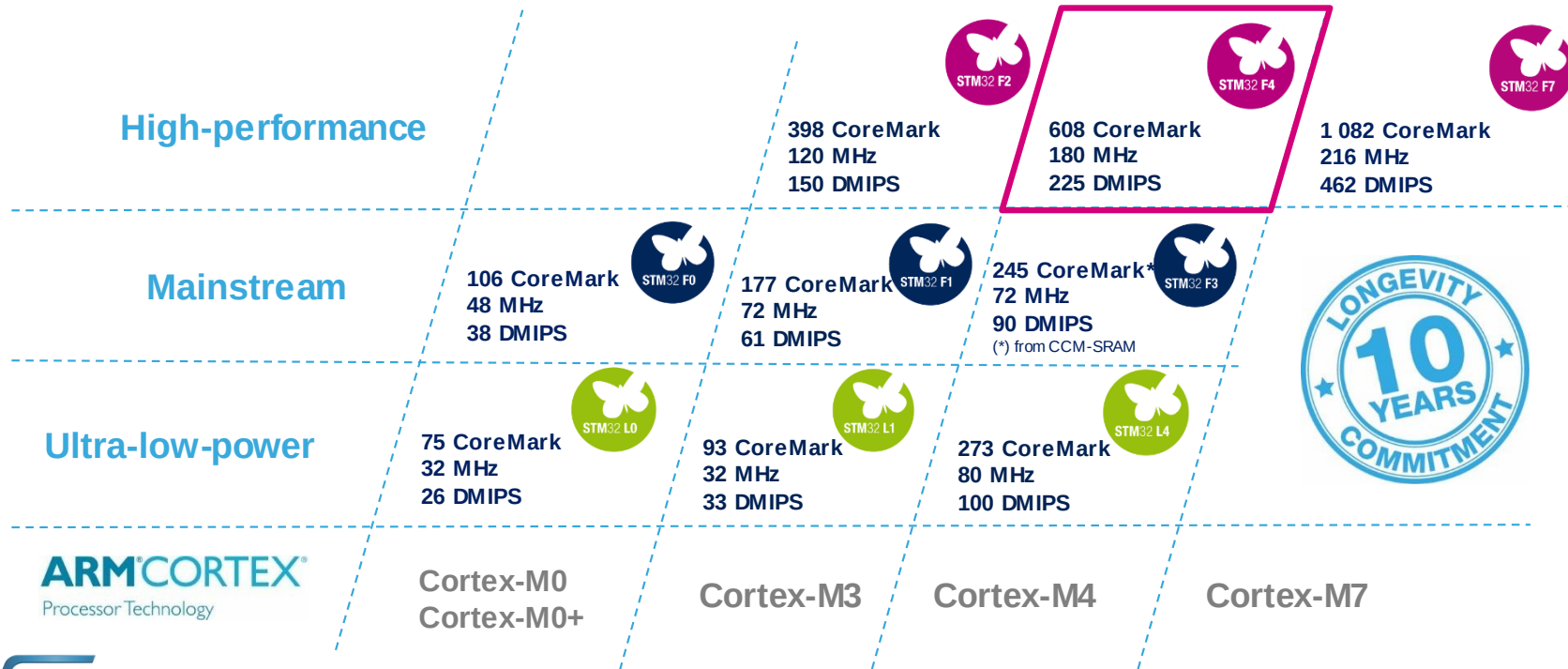
October 26th 2015



Today - STM32 portfolio positioning

2

More than 30 product lines



ARM CORTEX
Processor Technology

Cortex-M0
Cortex-M0+

Cortex-M3

Cortex-M4

Cortex-M7

Cortex-M processors binary compatible

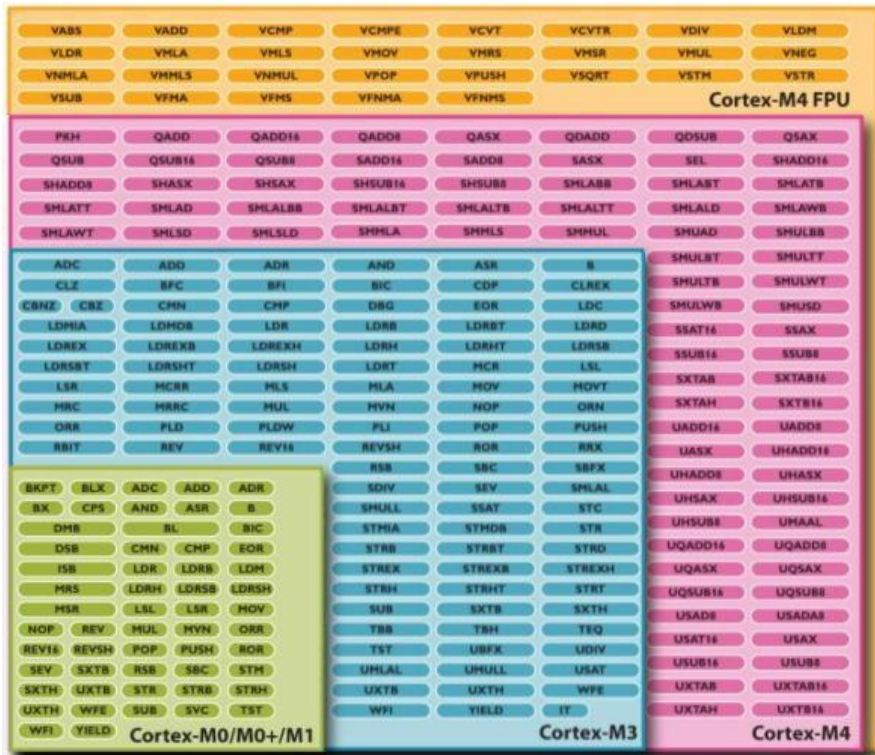
3

Floating Point Unit (FPU) ●

DSP (SIMD, fast MAC) ●

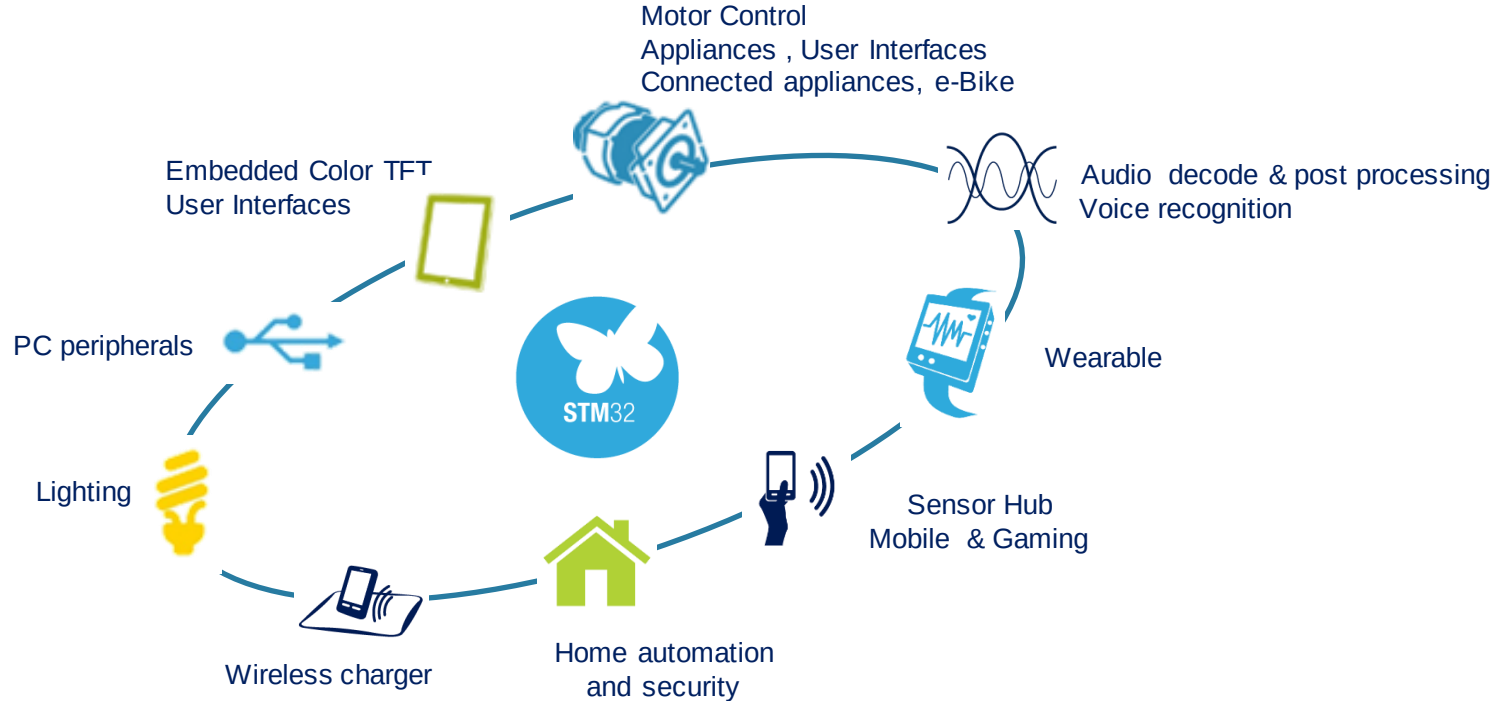
Advanced data
processing
Bit field manipulations ●

General data
processing
I/O control tasks ●



Examples of STM32 applications

4

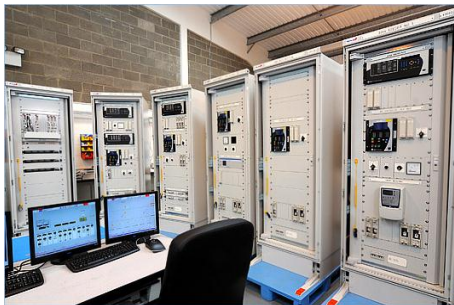






All type of applications 6

Industrial Automation



Medical



White Goods



Automotive



STM32F427/437/429/439

7

- Packages

- WLSCP143 (<4.5x5.6mm)
- LQFP100
- LQFP144
- LQFP176
- BGA176
- LQFP208
- BGA216

- Operating voltage

- 1.7 to 3.6V

- Temperature range

- -40 to 85 °C
- -40 to 105 °C



Notes:

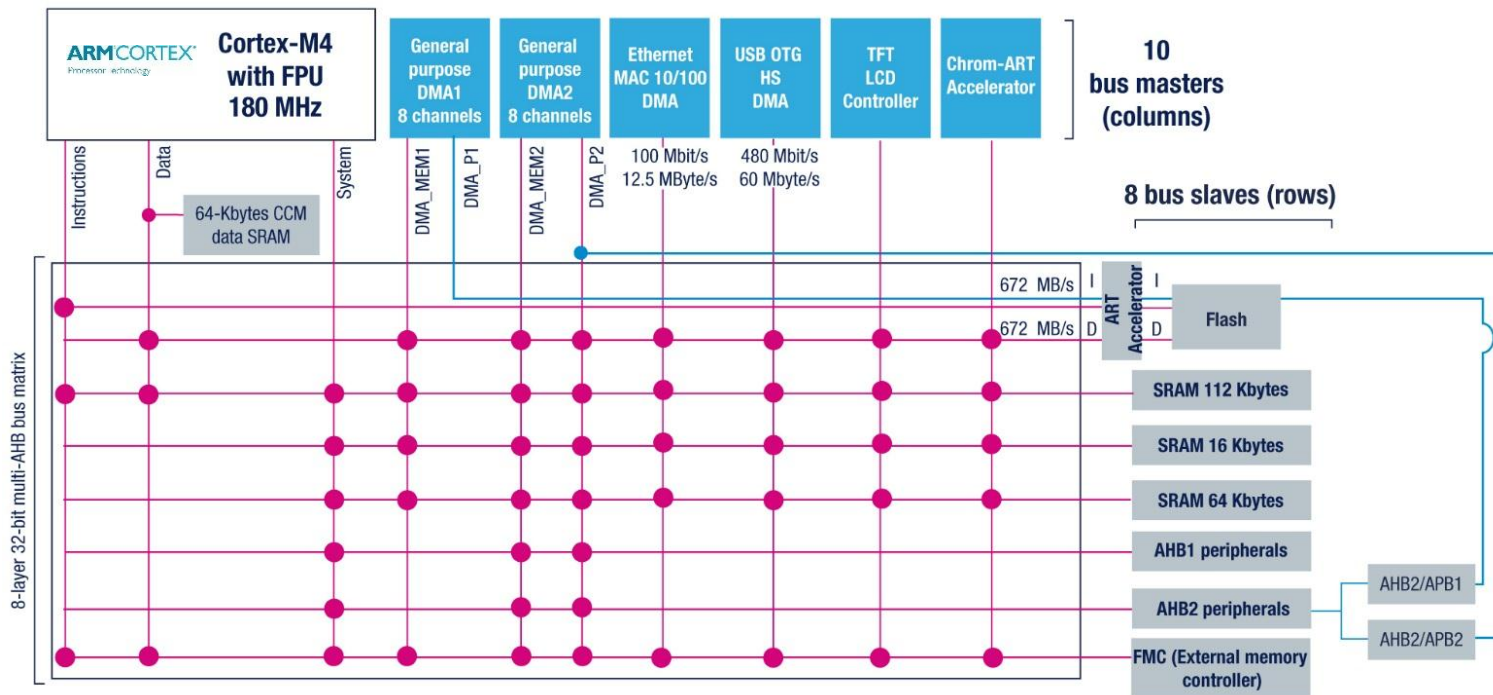
1. HS requires an external PHY connected to the ULPI interface
2. Crypto/hash processor on STM32F415, STM32F417, STM32F437 and STM32F439
3. With digital filter feature, up to 1 Mbit/second
4. For STM32F4x9 only



System performance

8

32-bit multi-AHB bus matrix





STM32F429 Highlights 1/3

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- 180 MHz / 225 DMIPS
- Dual bank Flash (in both 1-MB and 2-MB), 256KB SRAM
- SDRAM Interface (up to 32-bit)
- LCD-TFT controller supporting up to XGA (1024x768)
- Better graphics with **ST Chrom-ART Accelera4tor™**:
 - **x2 more performance vs. CPU alone**
 - **Offloads the CPU for graphical data generation:**
 - Raw data copy
 - Pixel format conversion
 - Image blending (image mixing with some transparency)
- 100 μ A typ. in Stop mode





STM32F429 Highlights 2/3

10

- ARM® Cortex®-M4F core with DSP and floating point
- Up to 2MB Internal flash in two banks
 - ART Accelerator™
- 256KB Internal SRAM including 64KB core coupled data memory
- Up to 180 GPIOs
 - Up to 164 fast mode at 90 MHz
 - Up to 166 5V tolerant pins
- Power from 1.7 to 3.6V
- SWD & JTAG interfaces
- Cortex M4 Trace Macrocell





STM32F429 Highlights 3/3

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- Hi Speed internal or external clock
 - Fcpu up to 180 MHz
 - 4 – 16 MHz crystal oscillator
 - Internal 16MHz with 1% accuracy
- Internal 32KHz with calibration, mostly for RTC
- Low Power modes Sleep, Stop, and Standby
- Vbat supply for RTC, 4KB backup SRAM.





Currently Integrated Peripherals 1/2

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The following peripherals are currently supported under Java ME
(See <http://docs.oracle.com/javame/8.1/get-started-stm/stmportsapdx.htm>):

- ADC
- GPIO Pins
 - LED pins preconfigured
 - GPIO ports pa – pi supported (8 pins per port)
- I2C1 (connected to IO Expander)
- SPI5 with CS active low
- UART1



Currently Integrated Peripherals 2/2

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- Watchdog timer set at 4 seconds
- LCD used as text only terminal
 - No scrolling
 - 15 lines x 52 characters
- FMC (used internally for running from SDRAM)
- Ethernet



Other Peripherals 1/4

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These peripherals are also on the chip:

- Graphics mode LCD-TFT controller
- More ADC channels
- 2x12-bit D/A Converters
- DMA: 2 controllers, 16 channels with FIFOs and Burst support



Other Peripherals 2/4

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- Up to 17 timers
 - 12x 16-bit, up to 180 MHz
 - 2x 32-bit, up to 180MHz
 - Each has up to 4 IC/OC/PWM or pulse counter and quadrature encoder input
- 3x I2C interfaces (SMBus/PMBus)
- 4x USARTs/UARTs
 - Up to 11.25Mbit
 - ISO 7816 interface
 - LIN, IrDA, modem control
- 6x SPI at 45Mbit/sec
 - 2 with mixed full duplex I2S



Other Peripherals 3/4

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- 1x SAI
- 2x CAN and SDIO
- USB 2.0 full speed device/host/otg with on chip PHY
- USB 2.0 high speed/full speed device/host/otg
 - Dedicated DMA channel
 - On-chip full speed PHY and ULPI



Other Peripherals 4/4

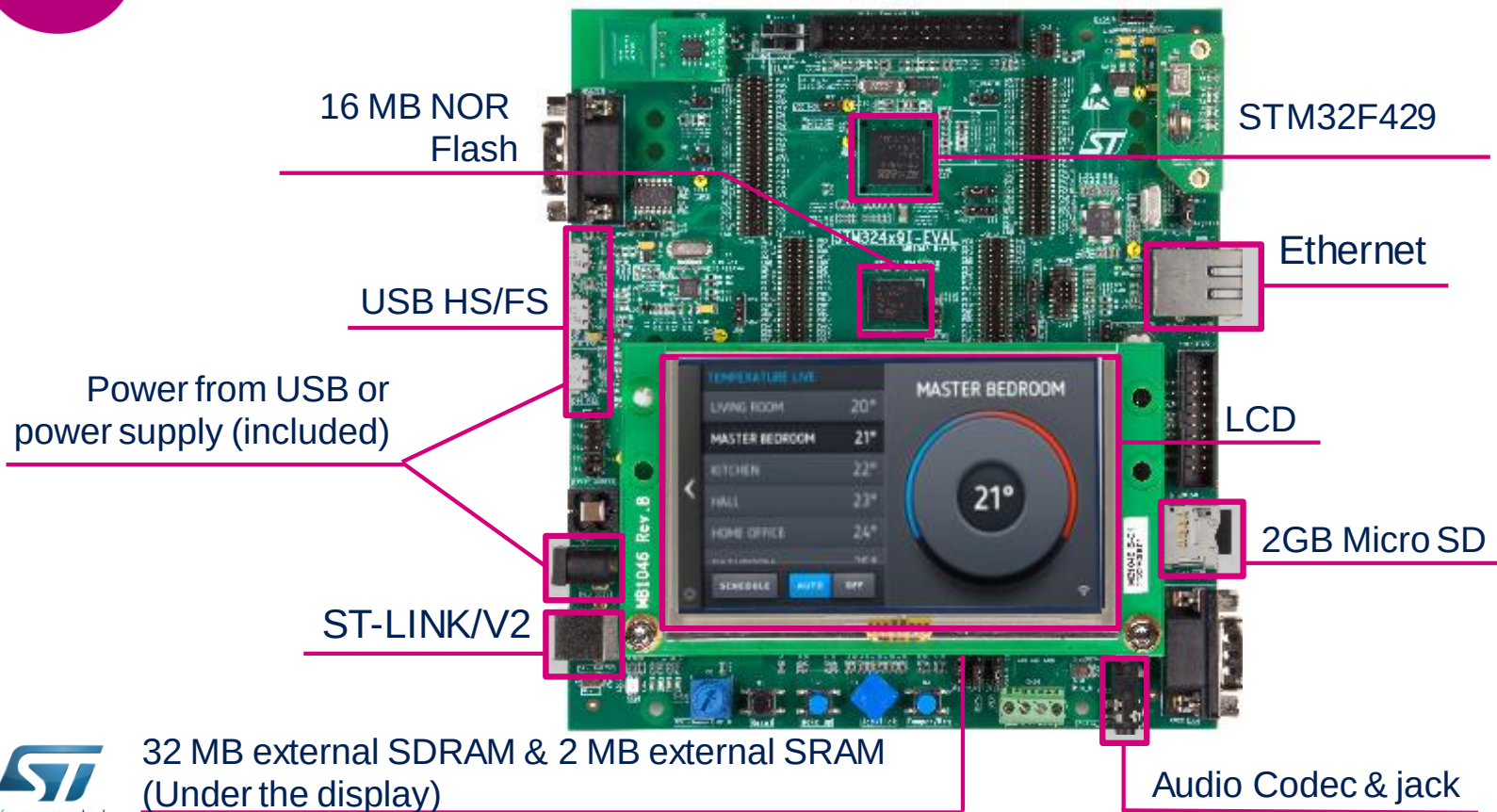
17

- DCMI 8, 10, 12, or 14 bit parallel interface
 - YCbCr4:2:2 or RGB565 progressive, or JPEG
 - All preprocessing must be performed on camera module
 - 54 MBytes/sec
- True Random Number Generator
- CRC calculation unit
- RTC with subsecond accuracy, hardware calendar



Development STM32429I-EVAL board

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Development Environment

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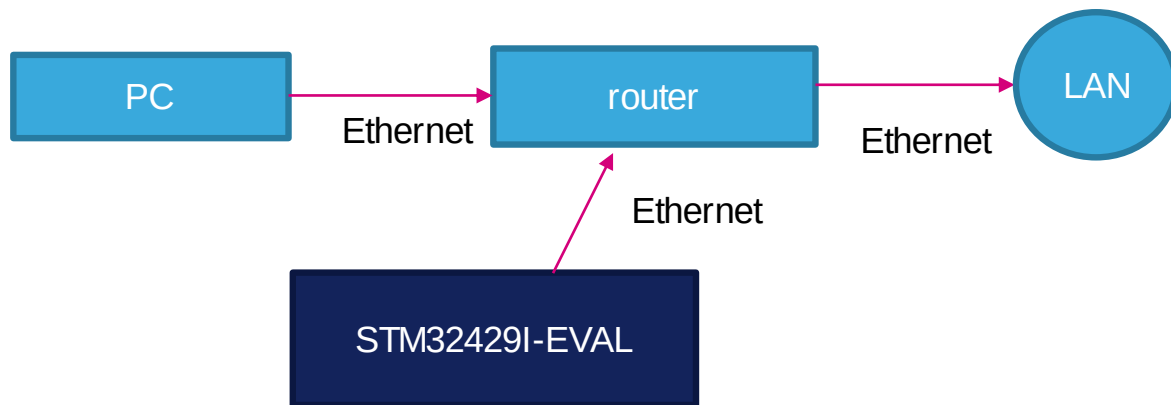
- IDE: Netbeans (<https://netbeans.org/downloads/index.html>)
- To load VM on board use STLink (STLink Utility, Keil, etc)
 - ST-Link Utility is at <http://www.st.com/web/en/catalog/tools/PF258168>
- Java ME from <http://www.oracle.com/technetwork/java/embedded/javame/embed-me/downloads/java-embedded-java-me-download-2162242.html>
 - See Getting Started Guide for detailed instructions



Development Environment

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- Connect the Eval board to PC and a router to provide a DHCP server





For More Information

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http://www.st.com/web/catalog/mmc/FM141/SC1169/SS1577/LN1806/PF255172?s_searchtype=partnumber#

- Reference Manual for STM32F429
- Datasheet
- Links to pages for the evaluation boards
 - User manuals
 - Schematics
- Many Application Notes and other technical resources



Deploying Java ME 8.1 on STM32429I-EVAL

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- Full instructions in Getting Started Guide at <http://docs.oracle.com/javame/8.1/get-started-stm/running.htm#CHDHDEHJ>
- Required items:
 - [Oracle Java ME 8.1 for ST Micro](#)
 - [STM32F429I-EVAL board \(the STM32F439 version will also work\).](#)
 - Windows 7, 8, or 10
 - USB-A to USB-B cable
 - Ethernet cable(s) – quantity depends on setup
 - USB-A to MicroUSB cable
 - Terminal emulator program (PuTTY, TeraTerm, etc)
 - MicroSD card 2GB or higher



Install Keil development tools

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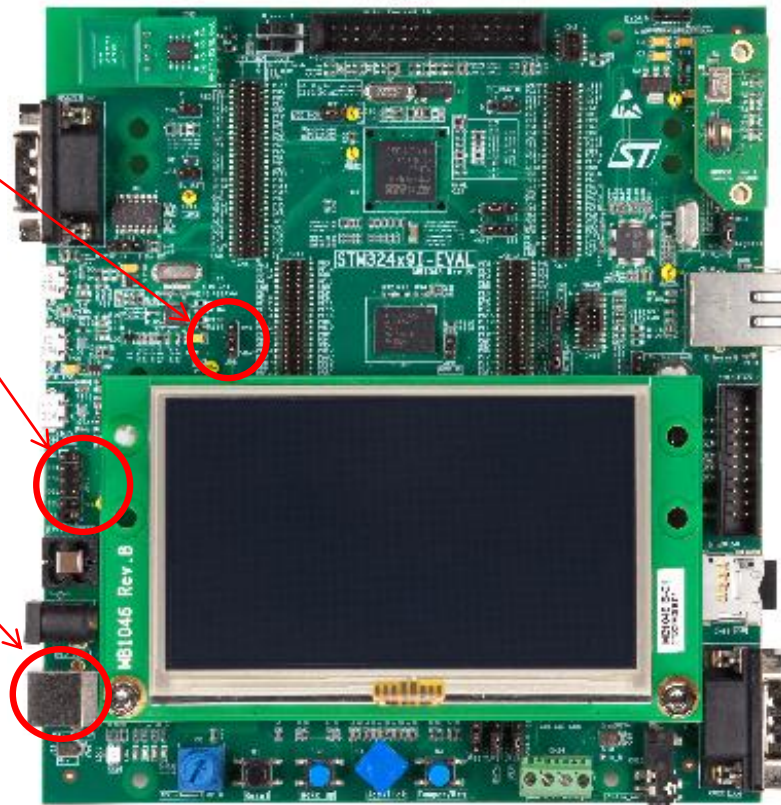
- <http://www2.keil.com/mdk5/install>
- Install STLink Drivers from:
<http://www.st.com/web/catalog/tools/FM147/SC1887/PF258168#>
- Start Keil uVision and install needed Packs
 - Keil::STM32F4xx_DFP driver pack



Prepare Board

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- Set JP8 to 3.3V position
- Set JP12 to PSU position
- Connect USB Cable to board and computer (STLink)
- Connect ethernet cable
- Connect power





- Unzip Java ME distribution
- Format MicroSD card, if needed
 - Use FAT32, default AllocationTable size
 - Make sure Quick Format is not selected
- Copy the java/ folder inside the sd_card/ folder to the SDCard.
- Set up network and clock as described in documentation
- Insert SDCard on board, then connect power



Install Firmware

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- Keil used to download firmware
- Make sure SDCard is inserted and all connections in place
- Edit deploy.bat in Java\ folder to point to Keil path
- Run deploy.bat from command line.
- Press reset button, and Java will be running.

Releasing your creativity

13



www.st.com/stm32f4