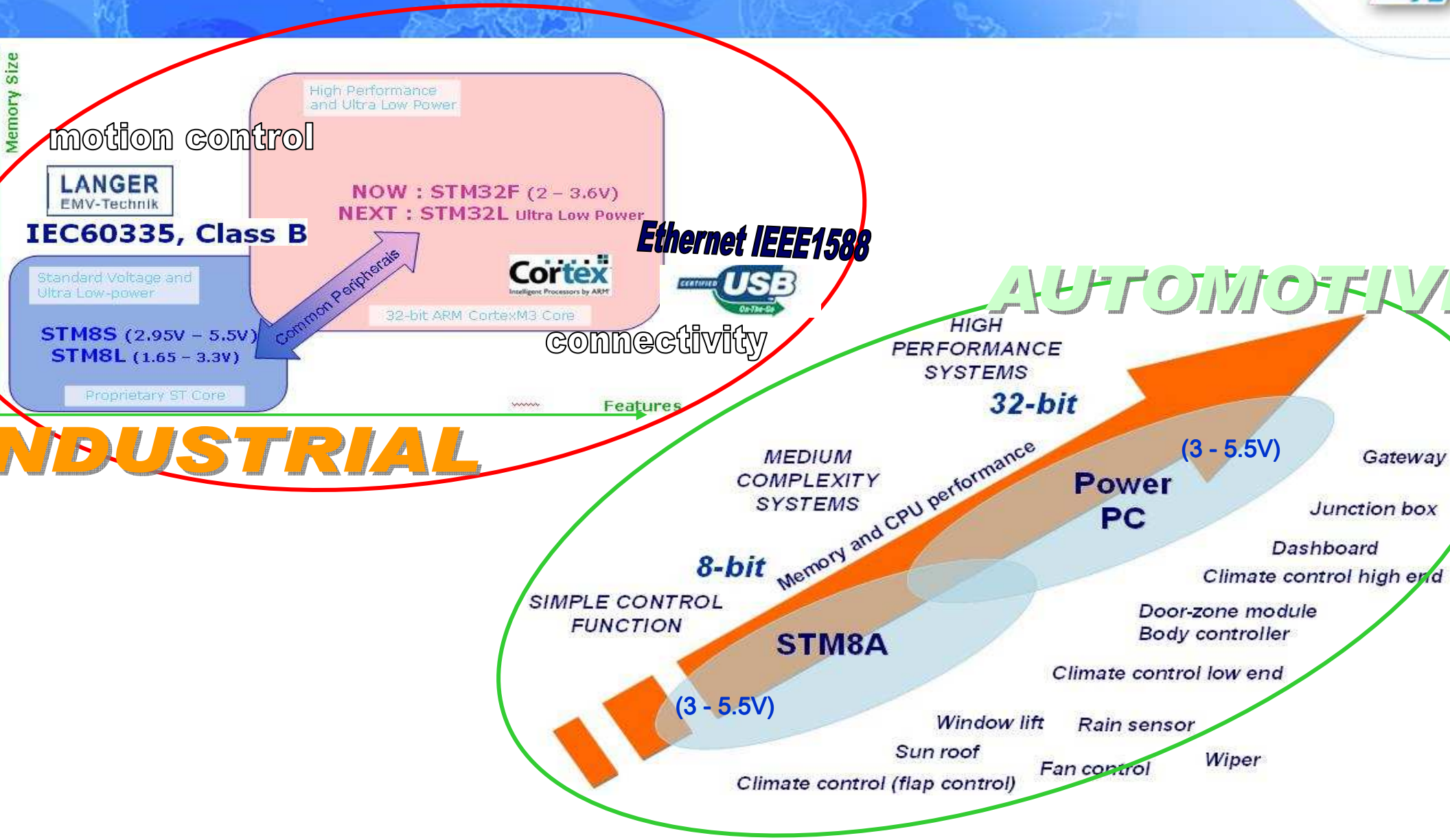
New Microcontroller

NEW MCU IN ST


Memory Size
motion control
LANGER
EMV-Technik
IEC60335, Class B
High Performance and Ultra Low Power
NOW : STM32F (2 – 3.6V)
NEXT : STM32L Ultra Low Power
Cortex
32-bit ARM CortexM3 Core
Ethernet IEEE1588
USB
connectivity
Standard Voltage and Ultra Low-power
STM8S (2.95V – 5.5V)
STM8L (1.65 – 3.3V)
Proprietary ST Core
Common Peripherals
Features
INDUSTRIAL
AUTOMOTIVE
HIGH PERFORMANCE SYSTEMS
32-bit
MEDIUM COMPLEXITY SYSTEMS
Memory and CPU performance
Power PC
(3 - 5.5V)
Gateway
Junction box
Dashboard
Climate control high end
8-bit
SIMPLE CONTROL FUNCTION
STM8A
Door-zone module
Body controller
Climate control low end
(3 - 5.5V)
Window lift
Rain sensor
Sun roof
Fan control
Wiper
Climate control (flap control)

STM32 FAMILY

STM32: Driving Convergence

The old Dilemma

16 bit
- Proprietary architecture
- Code constraints
- Limited performance
- Limited software and tools

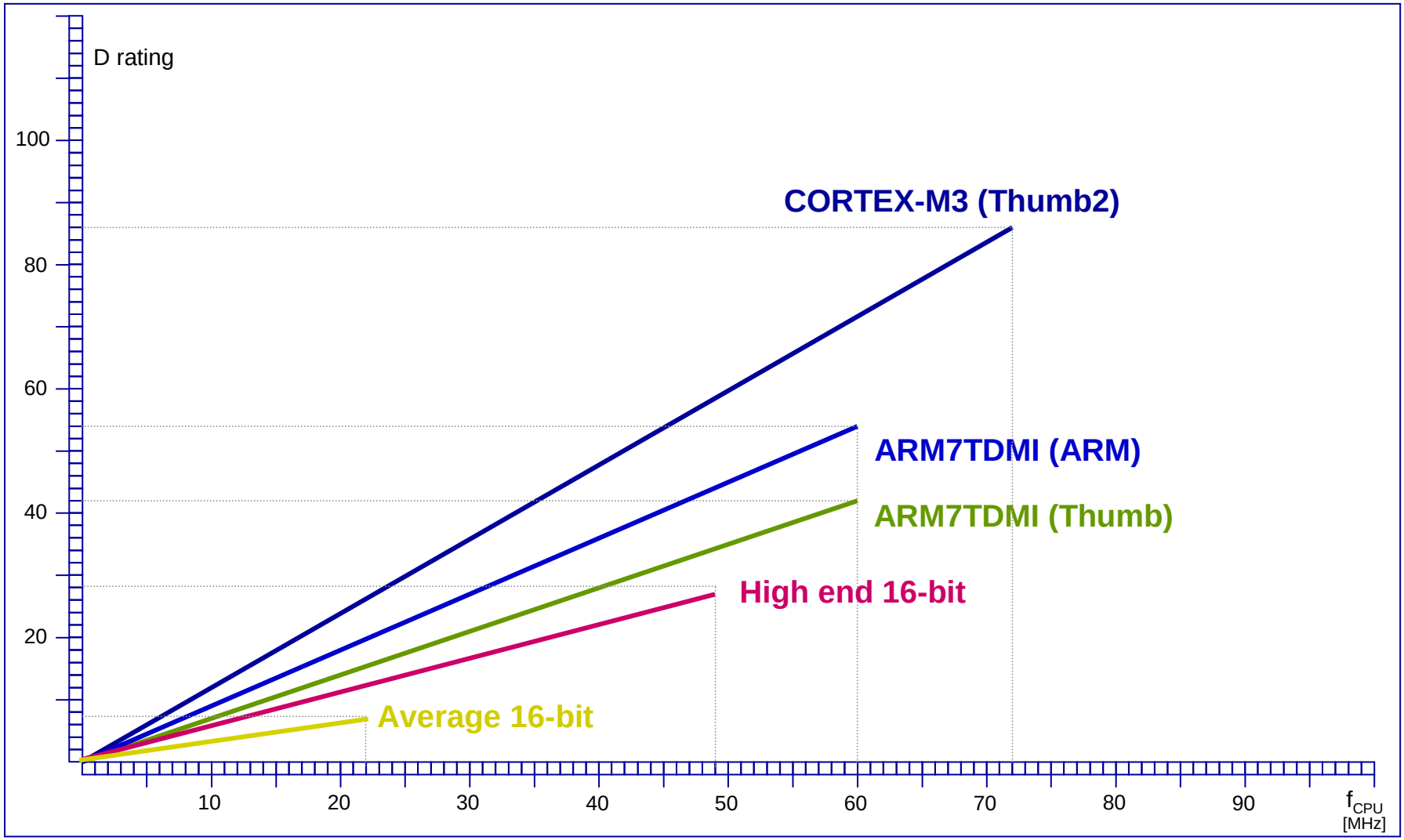
Vs

32 bit
- Higher cost
- Higher power consumption
- Less integration
- Perceived complexity

The STM32 way !

STM32
- Standard ARM® 32bit architecture
- Leading edge performance and low power capability
- Best code compactness, wide memory range
- ARM® Tools and Software Ecosystem
- Maximum integration and Accessible cost

TM32F10x: Leading Edge Architecture
ortex-M3 Core



STM32 product leadership

Since June 2007
STM32 reshapes the Microcontroller Market

2-years of volume production

in real life applications!

STM32 , a wide portfolio

Next

1MB
128K RAM
176pin

NOW

512K Flash PERFORMANCE
64K RAM
144pin TQFP

16KB Flash ACCESS
36 pin QFN
6x6mm

STM32F10x : product lines

All lines include:

- Multiple communication peripherals Up to 5 x USART, 3xSPI, 2xI^2C
- ETM*
- FSMC*
- 2-channel x 12-bit DAC*
- Up to 6 x 16-bit Timers
- Main Osc 4-16MHz
- Internal 8 MHz RC and 40 kHz RC
- Real Time Clock with Battery domain & 32KHz ext osc
- 2 x Watchdogs
- Reset circuitry and Brown Out Warning
- Up to 12 DMA cnls

+

Performance Line: STM32F103

72MHz CPU | Up to 512 KB Flash / 64KB SRAM | 2/3x12-bit ADC (1µs) Temp Sensor | USB–FS Device | SDIO* | I2S* | CAN | PWM timer

USB Access Line: STM32F102

48MHz CPU | Up to 128KB Flash / 16KB SRAM | 1x12-bit ADC (1µs) Temp sensor | USB–FS Device

Access Line: STM32F101

36MHz CPU | Up to 512KB Flash / 48KB SRAM | 1x12-bit ADC (1µs) Temp sensor

* Only with 256KB, 384KB, or 512KB devices

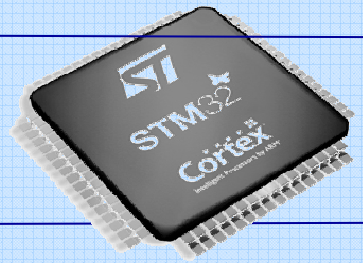
STM32 portfolio

ash
tes)

Connectivity line
Performance line
USB Access line
Access line

Cortex™-M3 CPU
- 4- to 64-Kbyte SRAM
- Four lines
- **Full compatibility** across 70 part numbers

Flash (Bytes)	36 pins QFN	48 pins LQFP	64 pins LQFP/BGA(1)	100 pins LQFP/BGA(2)	144 pins LQFP/BGA(1)
256 K			STM32F103RE	STM32F103VE	STM32F103ZE
			STM32F101RE	STM32F101VE	STM32F101ZE
128 K			STM32F103RD	STM32F103VD	STM32F103ZD
			STM32F101RD	STM32F101VD	STM32F101ZD
64 K			STM32F105/7RC	STM32F105/7VC	
			STM32F103RC	STM32F103VC	STM32F103ZC
			STM32F101RC	STM32F101VC	STM32F101ZC
32 K		STM32F103CB	STM32F105/7RB	STM32F105/7VB	
		STM32F102CB	STM32F103RB	STM32F103VB	
		STM32F101CB	STM32F102RB		
			STM32F101RB	STM32F101VB	
16 K	STM32F103T8	STM32F103C8	STM32F105R8	STM32F105V8	
		STM32F102C8	STM32F103R8	STM32F103V8	
	STM32F101T8	STM32F101C8	STM32F102R8		
			STM32F101R8	STM32F101V8	
8 K	STM32F103T6	STM32F103C6	STM32F103R6		
		STM32F102C6	STM32F102R6		
	STM32F101T6	STM32F101C6	STM32F101R6		
6 K	STM32F103T4	STM32F103C4	STM32F103R4		
		STM32F102C4	STM32F102R4		
	STM32F101T4	STM32F101C4	STM32F101R4		



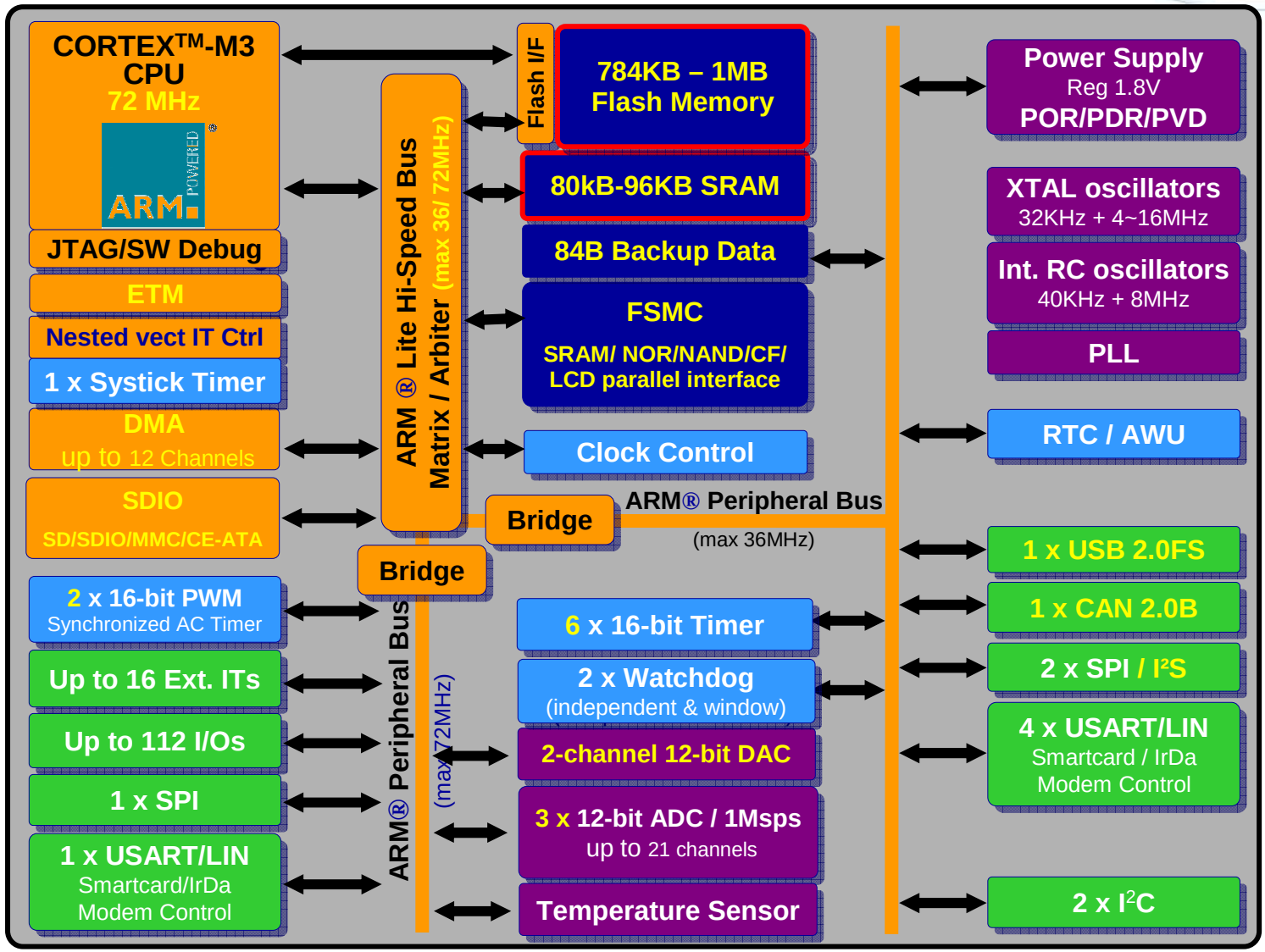
70 part numbers in volume production now!

(1) BGA64 and BGA144 for Performance line only
(2) BGA100 for Performance line only. BGA100 under development for Connectivity line

STM32 Releasing your creativity

EW: STM32F10x 1MB

- 2-channel 12-bit DAC
- FSMC
- ETM
- SDIO
- I²S
- 12 channels DMA
- 2xPWM timers
- 3xADCs
- Up to 112 I/Os (144 pins package)



STM32F10x : product lines

All lines include:

- Multiple communication peripherals Up to 5 x USART, 3xSPI, 2xI²C
- ETM*
- FSMC**
- Dual 12-bit DAC***
- Multiple 16-bit Timers
- Main Osc 4-16MHz
- Internal 8 MHz RC and 40 kHz RC
- Real Time Clock with Battery domain & 32KHz ext osc
- 2 x Watchdogs
- Reset circuitry and Brown Out Warning
- Up to 12 DMA cnls

Performance Line: STM32F103

72MHz CPU	Up to 1024 KB Flash / 128KB SRAM	2/3x12-bit ADC (1µs) Temp Sensor	USB–FS Device	SDIO*	I2S*	CAN	PWM timer

USB Access Line: STM32F102

48MHz CPU	Up to 128KB Flash / 16KB SRAM	1x12-bit ADC (1µs) Temp sensor	USB–FS Device

Access Line: STM32F101

36MHz CPU	Up to 512KB Flash / 48KB SRAM	1x12-bit ADC (1µs) Temp sensor

* Only with Performance/Access Lines 256KB, 384KB, or 512KB devices

Value Line: STM32F100

24MHz CPU	Up to 512KB Flash / 32KB SRAM	1x12-bit ADC (1.2µs) Temp sensor	HDMI-CEC	PWM timer

** Only with 256KB, 384KB, 512KB or 1Mb devices

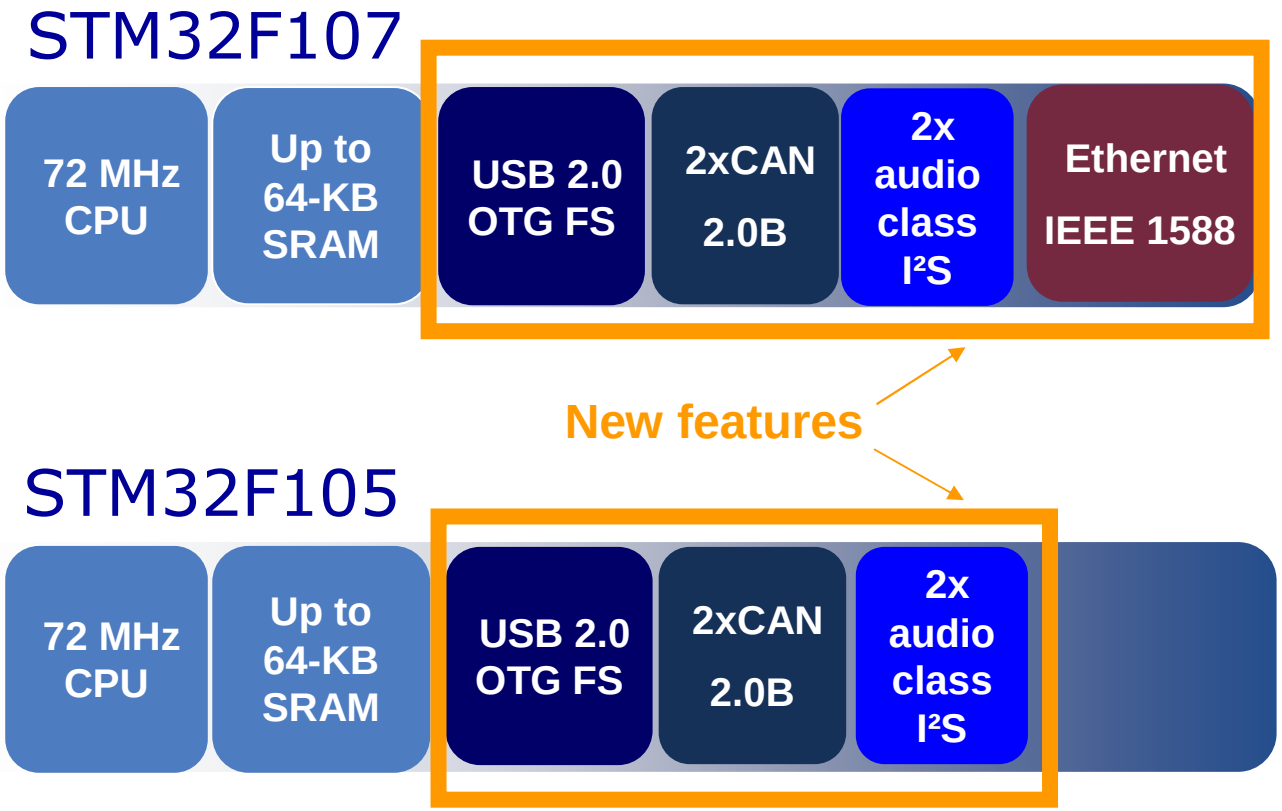
*** Only with 256KB, 384KB,512KB or 1MB devices except Value line on all memory range

TM32 connectivity line is available in 2 variants

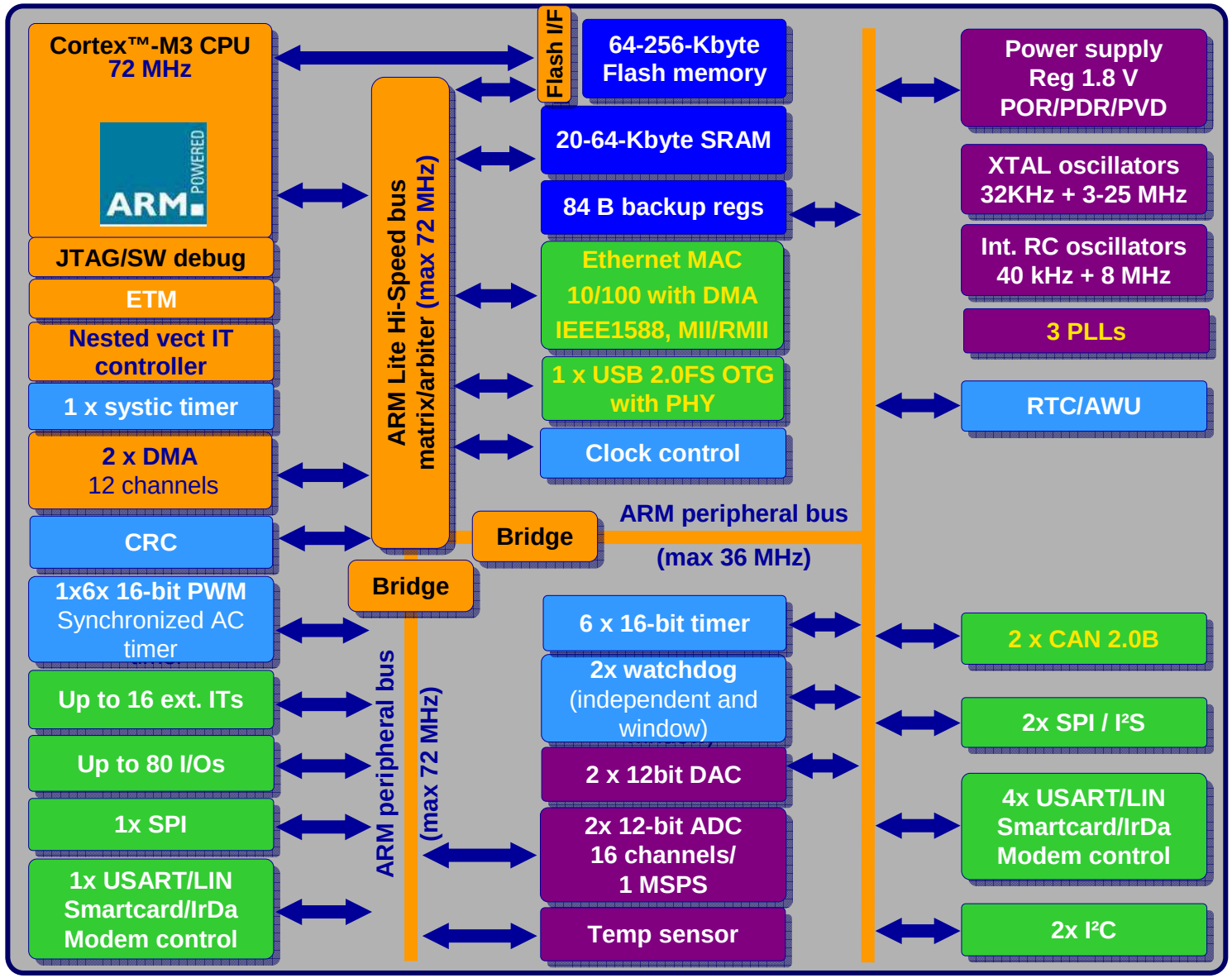
STM32 shared elements

- Up to 256-Kbyte Flash
- Multiple com peripherals
  USART, SPI, I²C
- Multiple 16-bit timers
- Dual DAC
- ETM
- Main 3-25 MHz oscillator
- Internal 8 MHz and 40 kHz RC oscillators
- Real-time clock
- 2 x watchdogs
- Reset circuitry
- 2 x 12-bit ADC 1µs Temperature sensor
- PWM timer
- Up to 12-channel DMA
- 80% GPIO ratio

+



New STM32F105/7 internal architecture



STM32F105/107 Connectivity line

Resale price for 10k units
STM32F105R8: from $2.9
STM32F107VC: from $4.9

Flash size (bytes)

K

K

K

STM32F105	STM32F107	STM32F105	STM32F107
STM32F105RC 64-Kbyte SRAM	STM32F107RC 64-Kbyte SRAM Ethernet	STM32F105VC 64-Kbyte SRAM	STM32F107VC 64-Kbyte SRAM Ethernet
STM32F105RB 32-Kbyte SRAM	STM32F107RB 48-Kbyte SRAM Ethernet	STM32F105VB 32-Kbyte SRAM	STM32F107VB 48-Kbyte SRAM Ethernet
STM32F105R 20-Kbyte SRAM		STM32F105V8 20-Kbyte SRAM	

64-pin LQFP

100-pin LQFP/BGA*

*BGA package under developmer

TM32 Connectivity line USB-enabled applications

Aftermarket car diagnostic tools

USB

Dual CAN

Home audio

STM32 Connectivity line brings:

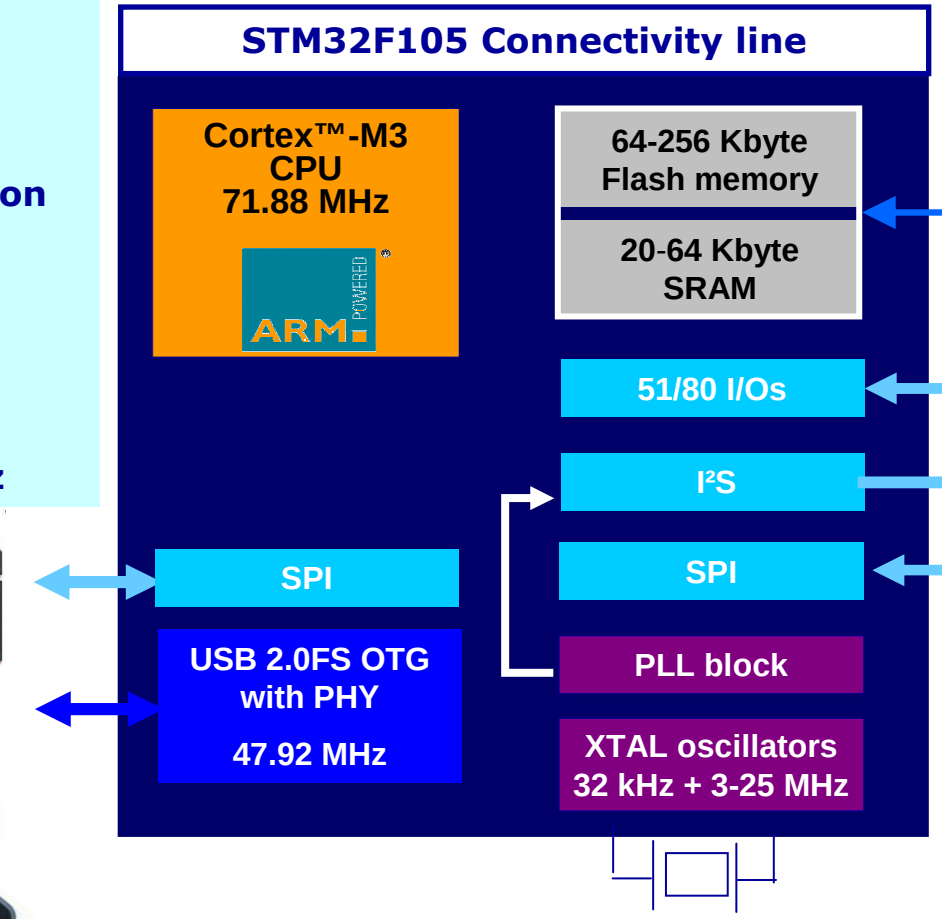
- Processing power: audio codec, OTG stack
- Communication peripherals and GPIOS: 2x I²S, USB Host,
- Simultaneous usage of USB and CAN, Ethernet
- Human-machine interface

Audio application example

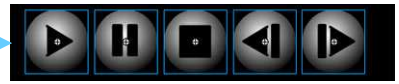
ommon requirements for audio

- Audio class I²S interface (16/32-bit data)
- Audio PLL (147.46 MHz) allowing:
  - less than 0.5% error on I²S master clock
  - 8 to 96 kHz audio sampling frequency
- USB FS OTG with PHY
- SPI for SD card support
- Processing power: 72 MHz

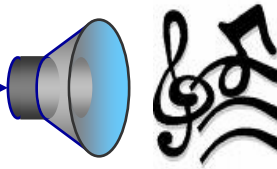
Audio software:
- Codec
- USB
- RTOS stacks



Playback buttons



Audio DAC — Amp



Audio sources:
- SD card

- USB mass storage device

- Music player

Chip-on-glas LCD

Fully scalable portfolio with five product lines

Multiple communication peripherals Up to 5 x USART, 3 x SPI, 2 x I²C
ETM**
FSMC**
Dual 12-bit DAC**
Multiple 16-bit timers
Main oscillator 4-16 MHz / 4-24 MHz/ 3-25 MHz**
Internal 8 MHz and 40 kHz RC oscillators
Real-time clock with battery domain and 32 kHz external oscillator
2 x watchdogs
Reset circuitry and brown out warning
Up to 12 DMA controls
2.0 to 3.6 V power supply, 5 V tolerant I/Os
-40 to +85 °C or up to 105 °C operating temperature range

+

Connectivity line STM32F105/STM32F107

72 MHz CPU	Up to 64-Kbyte SRAM	2 x 12-bit ADC (1 µs)	3-phase MC timer	USB 2.0 OTG FS	2 x CAN 2.0B	2 x I²S audio class	Ethernet* IEEE 1588

Performance line STM32F103

72 MHz CPU	Up to 96-Kbyte SRAM	2/3 x 12-bit ADC (1 µs)	3-phase MC timer	USB FS device	CAN 2.0B	2 x I²S**	SDIO**

USB Access line STM32F102

48 MHz CPU	Up to 16-Kbyte SRAM	12-bit ADC (1 µs)	USB FS device

Access line STM32F101

36 MHz CPU	Up to 80-Kbyte SRAM	12-bit ADC (1 µs)

Value line STM32F100

24 MHz CPU	Up to 8-Kbyte SRAM	12-bit ADC (1.2 µs)	3-phase MC timer	CEC

* STM32F107 only

** For specific part numbers, refer to the product documentation

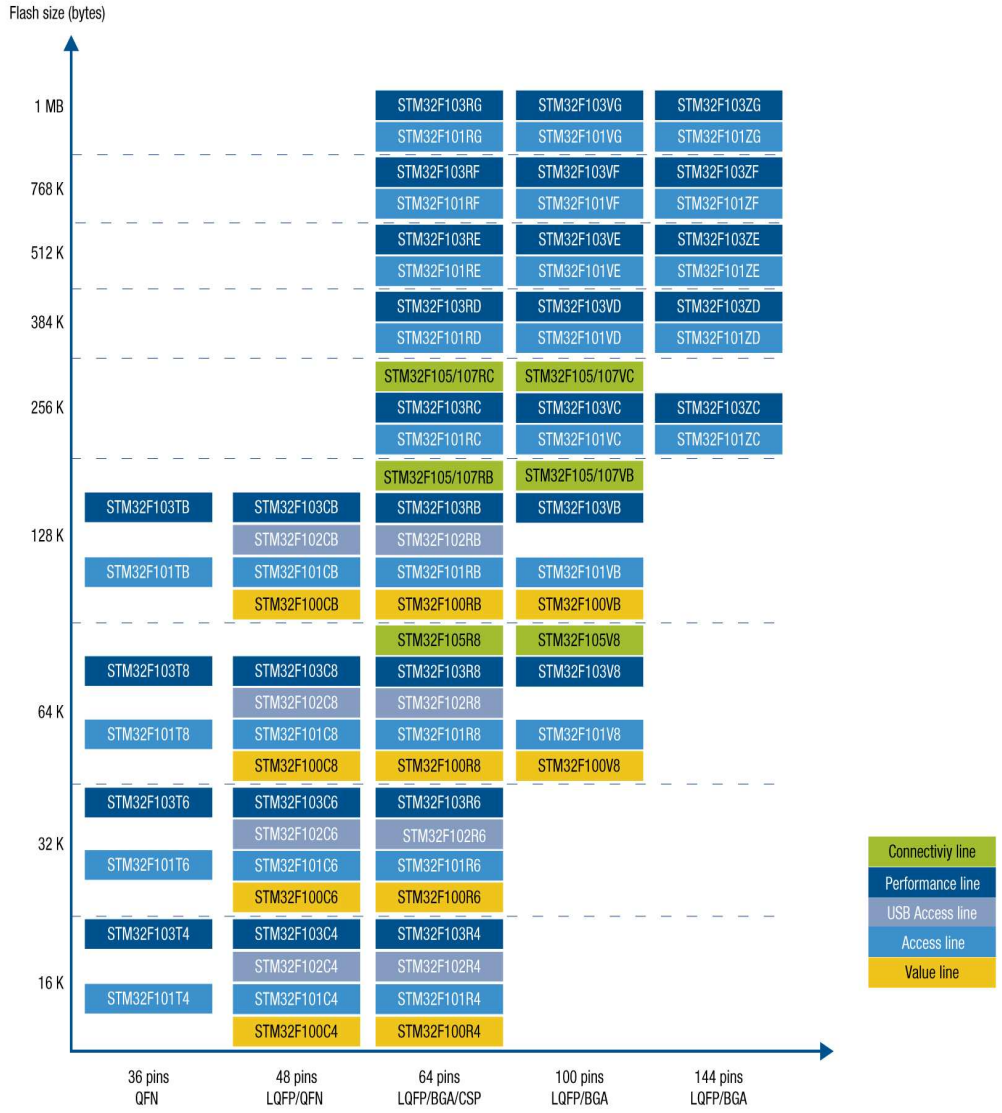
lore than 110 STM32 devices available

Five STM32 families with the new STM32 Value line

From 16-Kbyte to 1-Mbyte embedded Flash

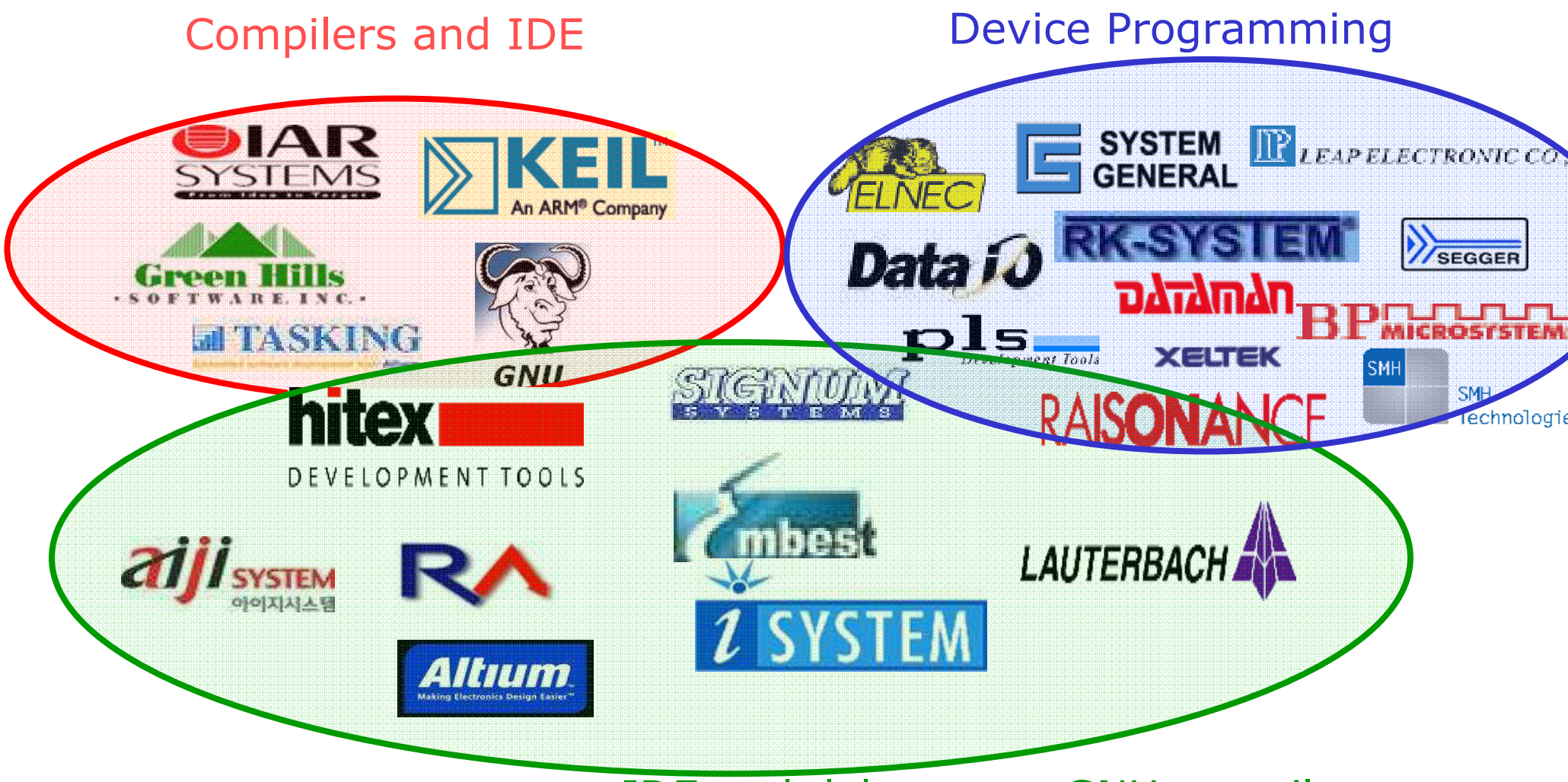
36-pin to 144-pin packages

All pin and software compatible across 110 devices



Software and hardware solutions

Comprehensive Development Tools Choice



STM32 line of tools and starter kits

- **Choice of complete hardware/software toolsets**
  - Evaluation boards
  - Compilers (Tasking, IAR, ARM or GNU C/C++)
  - Development software (HiTOP3, EWARM, µVision, RIDE)
  - Plus sample code

- **Proven solutions from:**
  - Hitex
  - IAR
  - Keil
  - Raisonance

- Minimal investment to start developing

STM32-comStick compact dev kit

Order from ST or Hitex

$69 resale

STM32-comStick

- Everything included
- Firmware, user's guide, CD
- USB-bus powered

Demonstrate and evaluate Ethernet, USB, connectivity

- Web server demo
- USB host demo

Full tool-chain from Hitex*

- Code size limit
- Full capability: editing, GNU compiling, Flash programming, and debugging with HiTop environment

hitex DEVELOPMENT TOOLS

*** For use on one STM32-comStick dongle**

Micrium µC-OS/III and STM32F107 evaluation board

Micrium's newest RTOS µC-OS/III bundle: a two-part book accompanied by a ST STM32F107 evaluation board.

- The 1st part covers the internals of µC/OS-III
- The 2nd part provides examples for using µC/OS-III on the popular STM32

Available at Amazon, $199.95

Available through ST: **STM32CMICOS-EVAL**, DCPL is $159 and RRP for Distri is $199.95

STM32 STLINK and Atollic True studio

- The ST-LINK debug probe
  - From ST and distributors
  - resale price of $21.

- Atollic TrueSTUDIO
  - downloaded from http://www.atollic.com/index.php/download
  - €995 for TrueSTUDIO/STM32 Pro,
  - Free of charge for TrueSTUDIO/STM32 Lite.

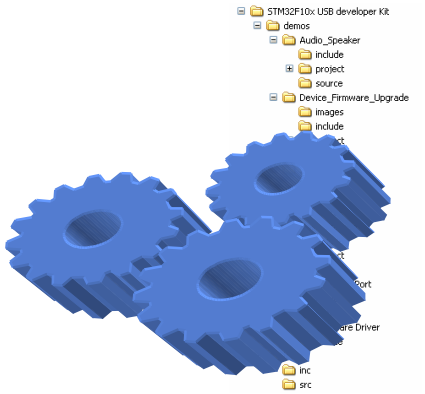
LITE/PRO VERSION FEATURE COMPARISION		
FEATURE	LITE	PRO
Price	Free	Low-cost
Supported languages	Assembler, C	Assembler, C and C++
ARM build & debug tools	✔	✔
PC build & debug tools	–	✔
GUI configuration of command line tool options	–	✔
Extensive IDE	✔	✔
Additional IDE features	–	✔
Graphical UML editors	–	✔
Integrated version control system client	–	✔
Integrated bug/task management system client	–	✔
Runtime libraries	Precompiled	Adaptable
JTAG dongle support	ST ST-LINK	Extensive
Technical support	–	Available
Unlimited code size	✔	✔
Unlimited usage time	✔	✔

STM32-EVAL – From ST

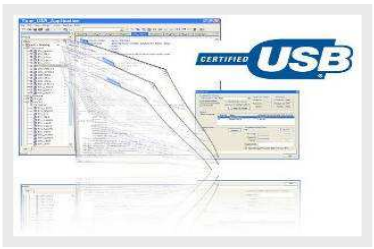
- Hardware Evaluation Platform for all interfaces
- Possible connection to all I/Os and all peripherals
- Flash is loaded with self-test firmware, and demos for USB, CAN, SD Card etc.
- Firmware projects available from www.st.com/mcu
- Vendor neutral (comes w
or JTAG cable)

Note: This is NOT a
starter kit. Tools must
purchased separately

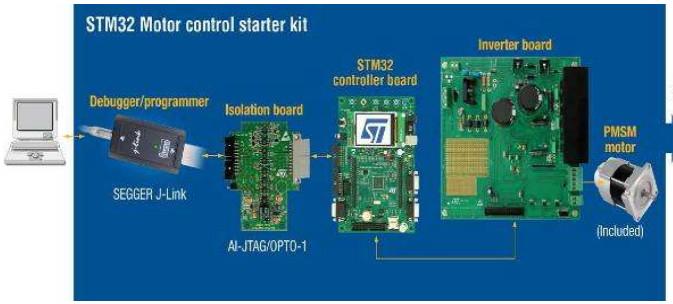
STM32 Software Solutions



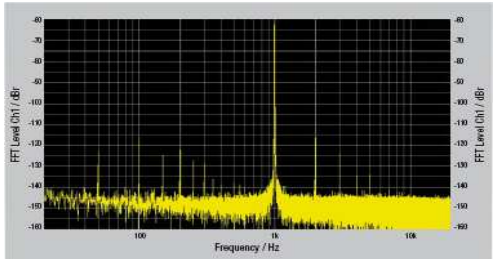
Free Standard Peripheral Library



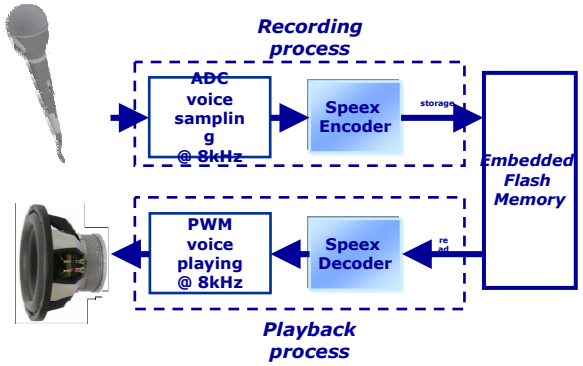
Free USB device library



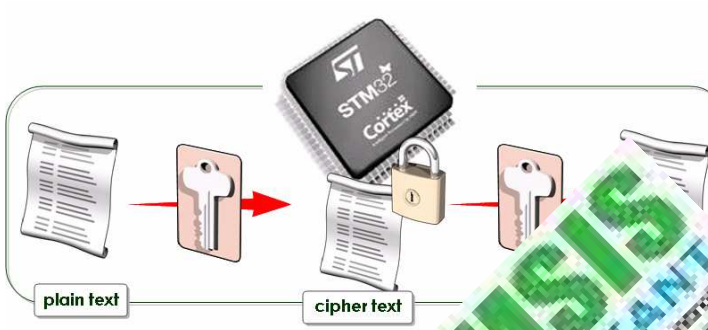
Free Motor Control Software
Free self-test routines for EN/IEC 60335-1 Class B



Free DSP Library

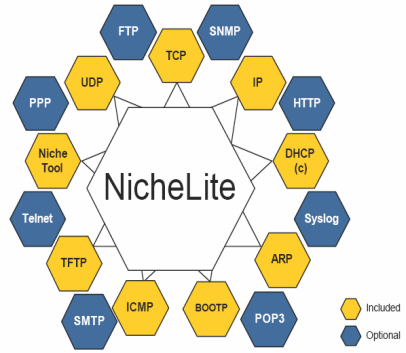


Free SPEEX Codec

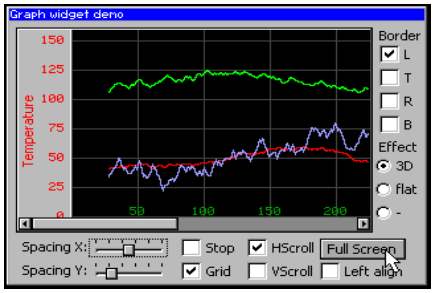


Free Encr
Library

STM32 Software Solutions from 3rd Parties

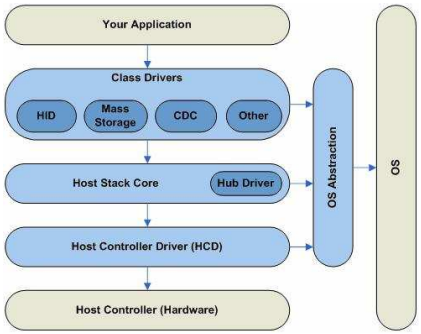


Free Nichelite TCP-IP stack with ST



Graphic library from Segger & Micrium

Numerous RTOS from 3rd parties

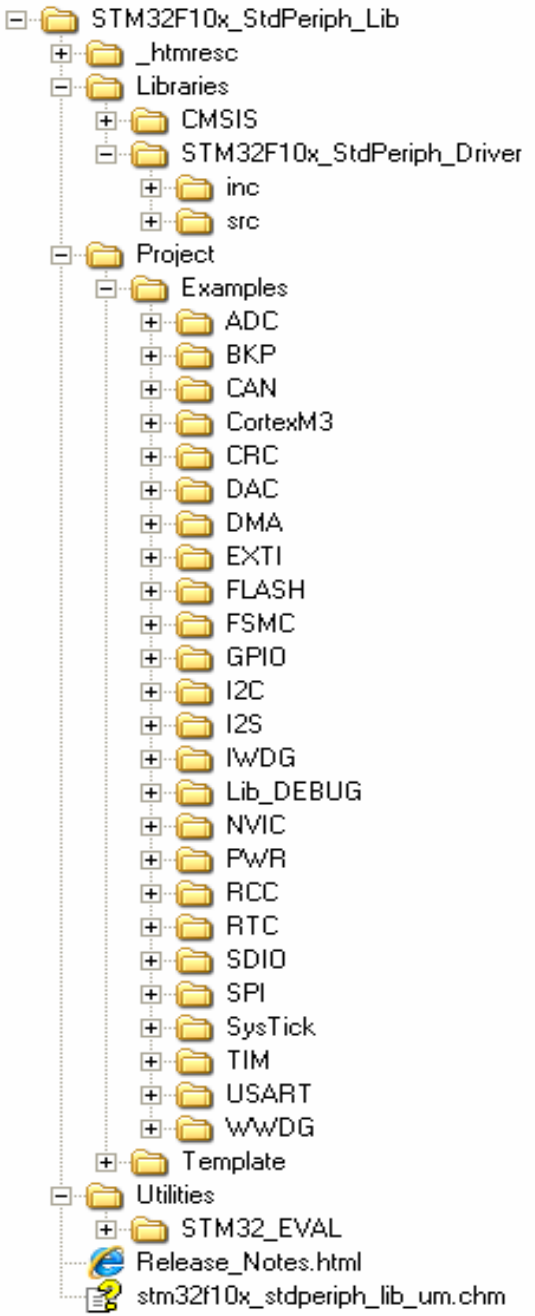


USB Host Solution from numerous 3rd Parties

Complete IP Protocols from numerous 3rd Parties

Free Standard Peripheral library from ST

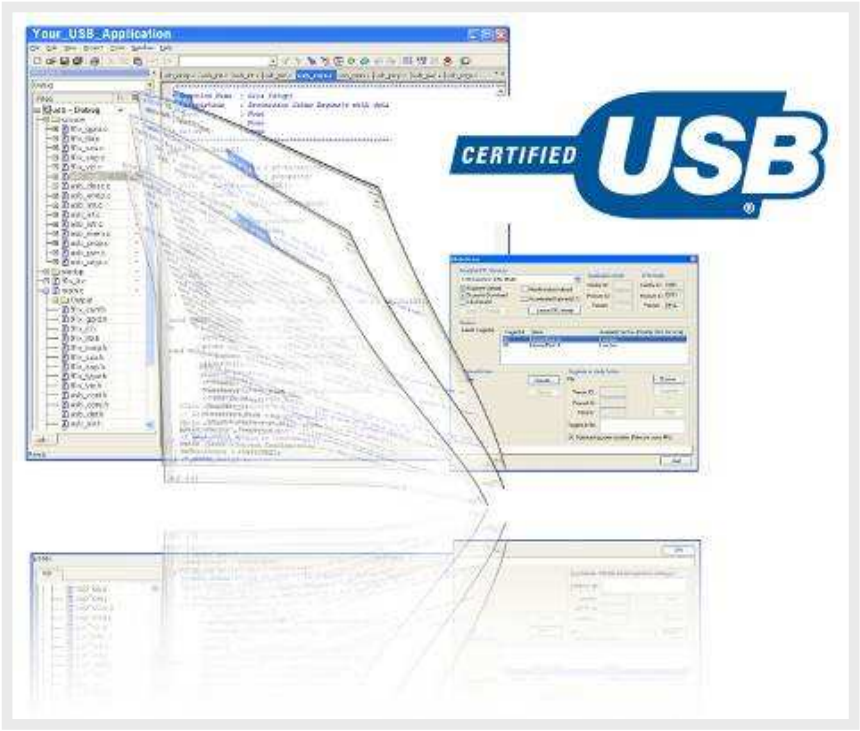
- ST software libraries free at www.st.com/mcu
  - C source code for an easy implementation of all STM32 peripherals in any application
  - Code implemented in demos for STM32 evaluation board



Free USB device software from ST

➔ Ansi-C source code available, supporting many USB classes:

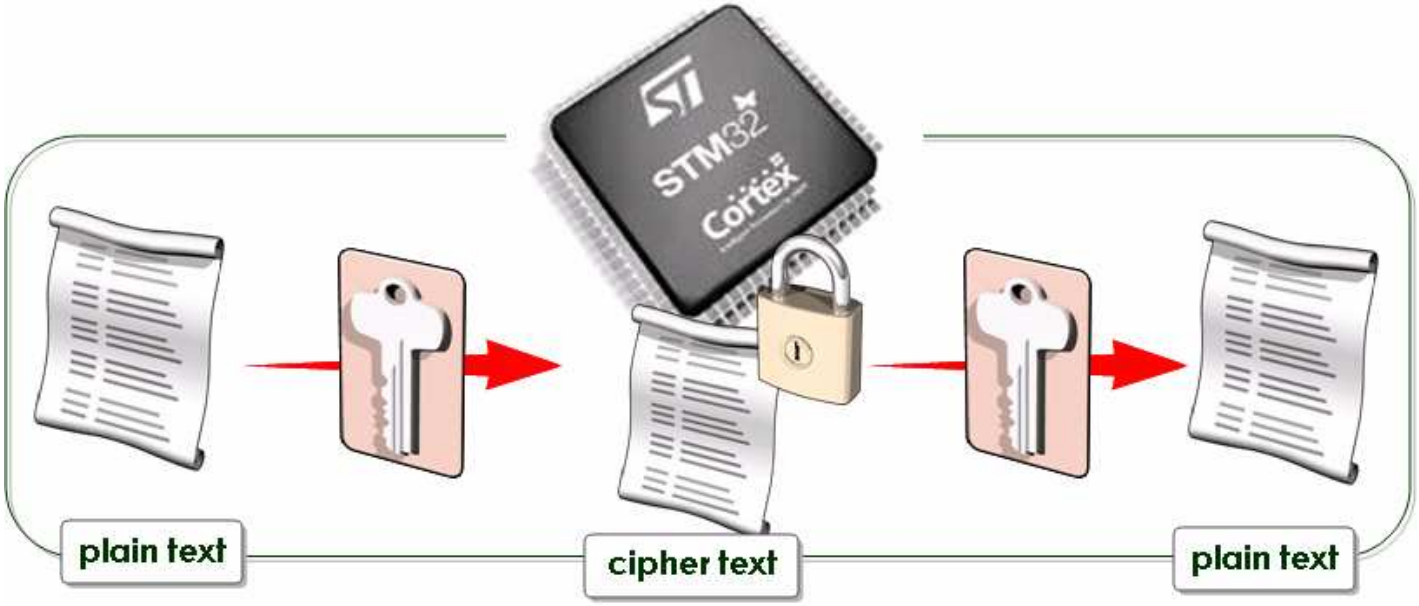
- Mass storage,
- HID
- DFU
- CDC
- Audio



Fee USB device library from ST

Encryption library for STM32

- **Optimized crypto library for the STM32 32-bit microcontroller**
- **DES, TDES and AES-ECB 128 bit symmetric key algorithm support**
- **Coupled with STM32 provides great performance with strong data protection.**

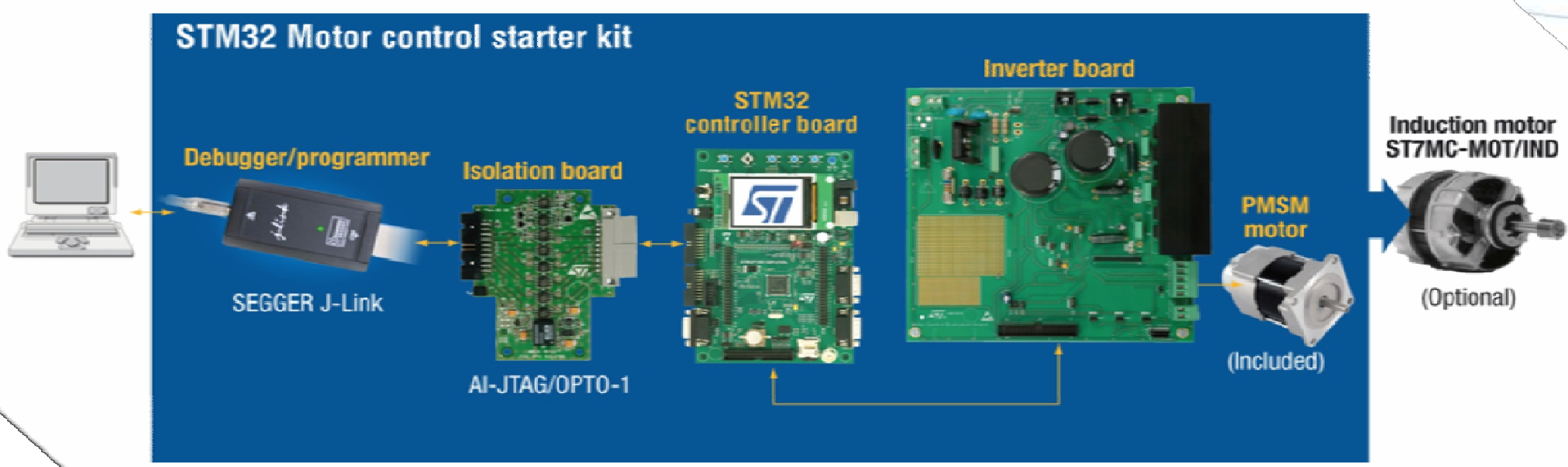


- **The AES-ECB 128 bit benchmark for STM32 is available upon request with 16,32,64 and 128 byte plaintext for Keil, IAR and Hitex toolchain**

Free STM32 DSP Library from ST

- **STM32 DSP software library provides a set of digital signal processing functions including:**
  - **PID controller, written in “C” and assembly language.**
  - **Complex radix 4 64, 256 and 1024 points 16-bit Fast Fourier transform (FFT) written in assembly language**
  - **Finite Impulse Response (FIR) filter, 16-bit, 32-tap**
  - **Infinite Impulse response Filter (IIR) filter, 16-bit canonic form 4 biquad and 16-bit direct-form I 8th-order IIR filter**
- **User manual documenting the API**
- **IAR, Keil and Raisonance toolchains support**

STM32 motor control kit and libraries



- STM3210B-MCKIT
- Kit includes
  - STM32 controller board
  - Inverter board
  - Motors
  - JTAG adapter and isolation board
- Free motor control libraries for
  - PMSM and AC induction motors
  - Field-oriented control
  - Sensor and sensor less

- **Dedicated kit for dual motor control and PFC support**
  - **STEVAL-IHM022V1 for dual motor control demonstration**
  - **STEVAL-ISF002V1 for PFC driver**

Third Party Software stacks and RTOS

IAR SYSTEMS

hitex DEVELOPMENT TOOLS

Green Hills SOFTWARE, INC.

KEIL An ARM® Company

Micriμm

SEGGER

RAISONANCE Embbeded Systems Development Tools

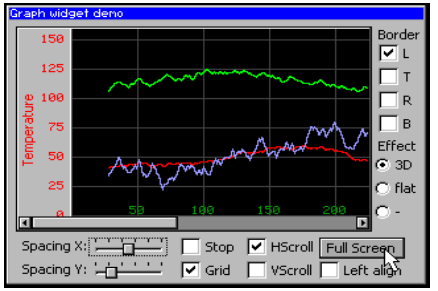
Quadros Systems Inc.

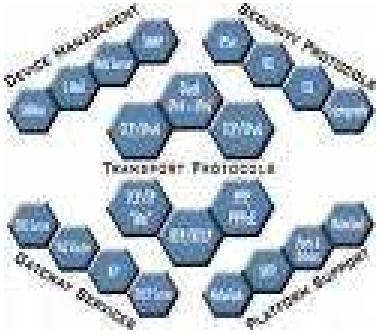
interniche technologies, inc.

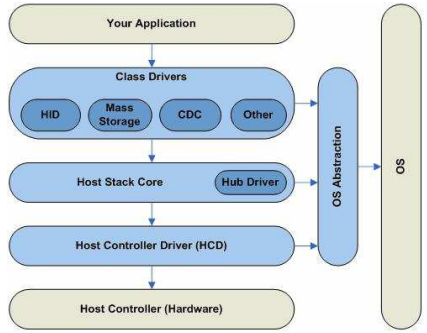
μd Micro Digital

Choice of complete software solutions

- Real Time Operating Systems
- USB Host/OTG and Ethernet stacks
- Graphics libraries







ow Available:
EC60335-1 approved self diagnostic routines

- ST's self-test library software modules have been approved by the VDE, a WW recognized test house which pioneered software safety inspection (http://www.vde.com/vde_en/)

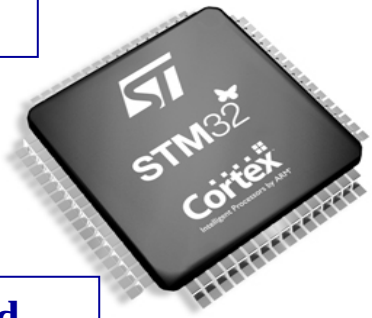
- A customer having its end-application certified by the VDE will not have to redo Self-diagnostic routines certification, if left unchanged
  - Integration and use of ST's routines will only be evaluated
  - Will decrease evaluation duration and cost
  - Information test report available on internet

STM32 SPEEX Speech Codec Library

Microphone

Voice input sampled at 8KHz by the on-chip 12-bit 1µs ADC

Converter and encoded and compressed at a 16:1 ratio fixed 8kbps bit rate



Output decoded speech on 16-bit PWM Timer

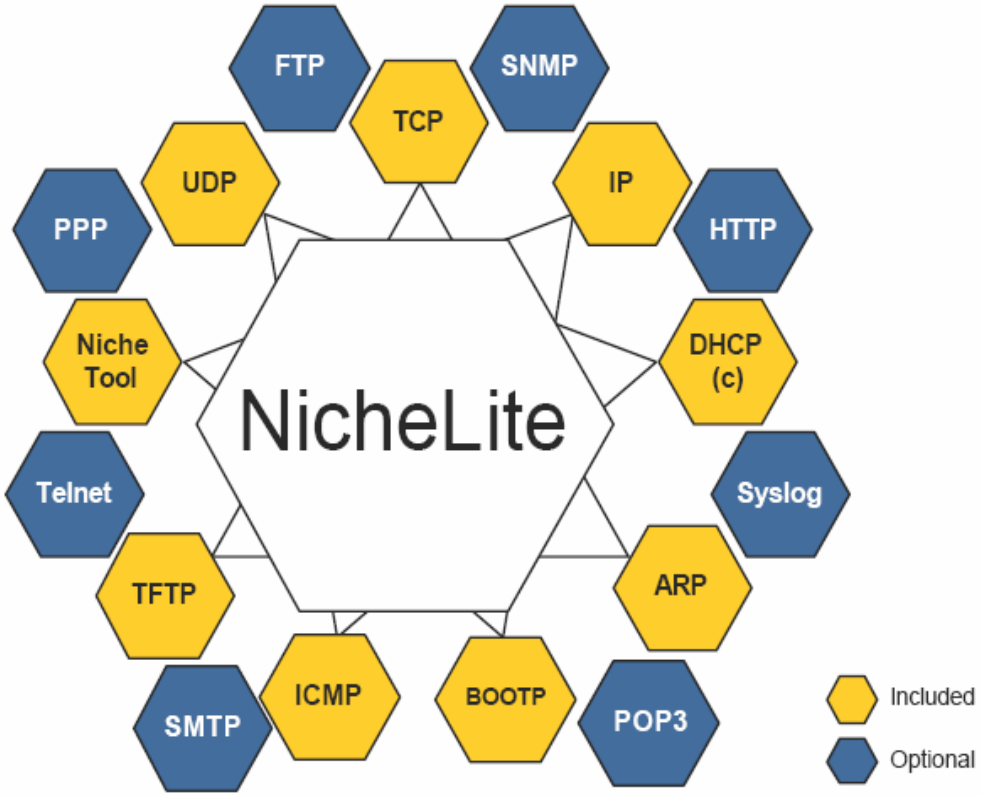
Speaker

- SPEEX open source encoding, decoding and compression format
- High level of compression with good sound quality
- For answering machines, building and home security systems, medical equipment, appliances

Encoder	**Program memory size**	**32KB**
	RAM memory size	**6.5KB**
	Encoder CPU load @72MHz	**52%**
Decoder	**Program memory size**	**32KB**
	RAM memory size	**3.7KB**
	Decoder CPU load @72MHz	**8%**

Free Ethernet software solutions from Interniche

NicheLite from Interniche



NicheLite TCP/IP highlights

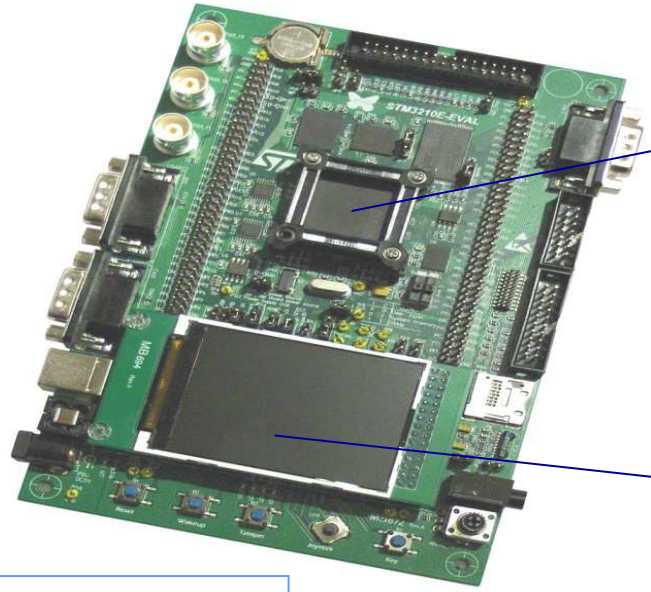
- Transmission control protocol (TCP) supporting InterNiche's lightweight API, a a zero-copy option
- Internet protocol (IPv4), without fragmentation and reassembly
- User datagram protocol (UDP)
- Address resolution protocol (ARP)
- Internet control message protocol (ICMP)
- Dynamic host configuration protocol (DHCP) client
- Name service (DNS) client
- Trivial file transfer protocol (TFTP), client and server
- Ping using ICMP
- Single Ethernet interface

➔Includes two operating systems:

– SuperLoop and NicheTask

And more through options and upgrades

STM32 Graphic LCD support



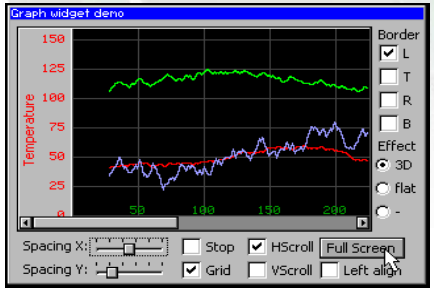
STM3210E-EVAL

Evaluation board

STM32F103ZET6
144 pin 512K flash
Performance Line

Parallel Link
FSMC
36 MHz

Ampire TFT-LCD
240 x 320
with ILI9320 controller



- **SEGGER emWin or Micrium µC/GUI**
- Complete graphic library, ANSI "C"-source code for STM32 CPUs
- Windows manager and Widgets, Font converter, memory manager, anti-aliasing, multilayer

http://www.segger.com/st.html
http://micrium.com/page/products/rtos/gui

RTOS solution for STM32

Company	RTOS
CMX Systems	CMX-RTX
eCosCentric	eCosPro
Express Logic	ThreadX
FreeRTOS	FreeRTOS
IAR	PowerPac
Interniche	
Keil	ARTX-ARM
Micrium	µC/OS-II
Micro Digital	smxARM
Quadros Sys-tems	RTXC Quadros
Segger	embOS

- **Get the most out of STM32 with an RTOS**
- Royalty-free, real-time operating systems (RTOS) for embedded applications
- Wide range of choices from leading RTOS providers

USB OTG software solutions

TM & © 2000 USB-IF All rights reserved.

Logo	Company	Product	USB Device	USB Host	USB OTG	Website
HCC	HCC-Embedded	USB	Yes	Yes	Yes	www.hcc-embedded.com, /www.hcc-embedded.com/en/solution/st_micro
IAR SYSTEMS	IAR	PowerPac USB	Yes	Yes	Yes	www.iar.com, www.iar.com/st
KEIL An ARM® Company	Keil	RL-USB	Yes	-	-	
µC/USB OTG	Micrium	µC/USB	Yes	Yes	Yes	www.micrium.com, www.micrium.com/st/index.html
Micro Digital	Micro Digital	smxUSBD smxUSBH smxUSBO	Yes	Yes	Yes	www.smxrtos.com, www.smxrtos.com/stmicro.htm
Quadros Systems Inc.	Quadros Systems	RTXCusb	Yes	Yes	Yes	www.quadros.com
SEGGER	Segger	emUSB	Yes	Yes	Yes	www.segger.com

thernet software solutions from 3rd parties

Logo	Company	Product	Website
	Interniche	NicheLite	www.iniche.com, www.st.com/mcu
	IAR	PowerPac TCP/IP	www.iar.com, www.iar.com/st
	Keil	RL-TCPnet	www.keil.com
	Micrium	µC/TCP-IP	www.micrium.com, www.micrium.com/st/index.h
	Micro Digital	smxNS	www.smxrtos.com, www.smxrtos.com/stmicro.h
	Quadros Systems	RTXC Quadnet RTXC Quark	www.quadros.com
	Segger	embOS/IP	www.segger.com

Ethernet software Open Source solutions

- lwIP and uIP are both ported on STM32 connectivity line.
- GCC-Eclipse, IAR IDE and CrossStudio IDE are supported
- WEB server demo based on lwIP (v 1.3) is now available

IEEE 1588 PTP Protocol Software - V2 from IXXAT

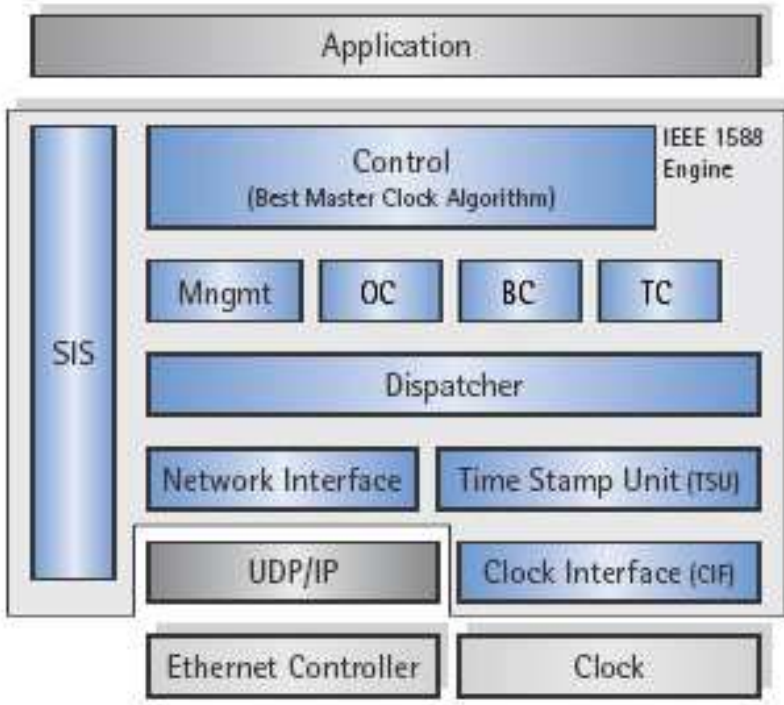
Functionality

The IEEE1588 V2 software is a full implementation of the IEEE 1588-2008 standard with the following features:

Ordinary/Boundary Clock
Transparent Clock
Unicast Messaging
Best Master algorithm
One step / two step support
Peer-to-peer and end-to-end delay mechanism
Management Protocol / Interface
Simple API for interfacing the application
Runs with and without OS
Easily adaptable to target hardware, UDP/IP stack and OS
Optimized filter algorithms for the usage in standard Ethernet networks with high bus loads

Contents of delivery

- Source code
- Software license
- Manual
- Technical support



Available in October 2009

STM32 Now & Next

NOW

The world's largest CortexM3 MCU offer:
70 part numbers
From 16K to 512K Flash
From 36pins to 144pins
USB, Ethernet, CAN
Motor control

STM32F10x
16K-512K Flash
Access/Performance
Access USB/Connectivity lines

Sampling by Q1 2010

HIGH PERFORMANCE
MIPS/MHz/MEMORY
HIGH BANDWITH PERIPHS

Alarm & Security
Factory automation
Audio, Metering

FEATURES DERIVATIVES
Analog, More Flash Memory

Medical
Gaming, Meteri
General purpos

ULTRA LOW POWER
Ultra low static leakage

Gluco meter
Gas & power meter
Portable GPS, DAB
Road Tolling

COST REDUCTION
Simple Peripherals, high value

Appliance
Printer, Home audio
Toys, 3D remote

STM32 Now & Next : answering 16-32bit trends

NOW

The world's largest CortexM3 MCU offer

STM32F10x

16K-512K Flash

Access/Performance

lines

NEXT

HIGH PERFORMANCE

MIPS/MHz/MEMORY

HIGH BANDWITH PERIPHS

STM32F200

Alarm & Secrurity
Factory automation
Audio, Metering

CONNECTIVITY And ANALOG

USB OTG , ETHERNET , STORAGE MEDIA ,

ADC 16/18 bit, Comp, Op Amp

Connectivity & Analog

Factory automation
Audio, Medical
Gaming, Metering

ULTRA LOW POWER

Ultra low static leakage

Ultra low uA/MHz

Low power analog

STM32L

Gluco meter
Gas & power meter
Portable GPS, DAB
Road Tolling

COST REDUCTIONS

Lower MHz

Simple Peripherals

STM32 Value Line

Printer, Home audio
Toys, 3D remote
Appliance

STM32 F-2 Series

Dec 2009

STM32 F-2 Series

- A new generation on STM32 with significant improvement in features / performance
  - More Memory
  - Advanced features
  - Maintain close pin-out compatibility
  - Maintain close software compatibility

➔Complement the existing family with more performance, memory and features

- Open new possibilities with advanced features

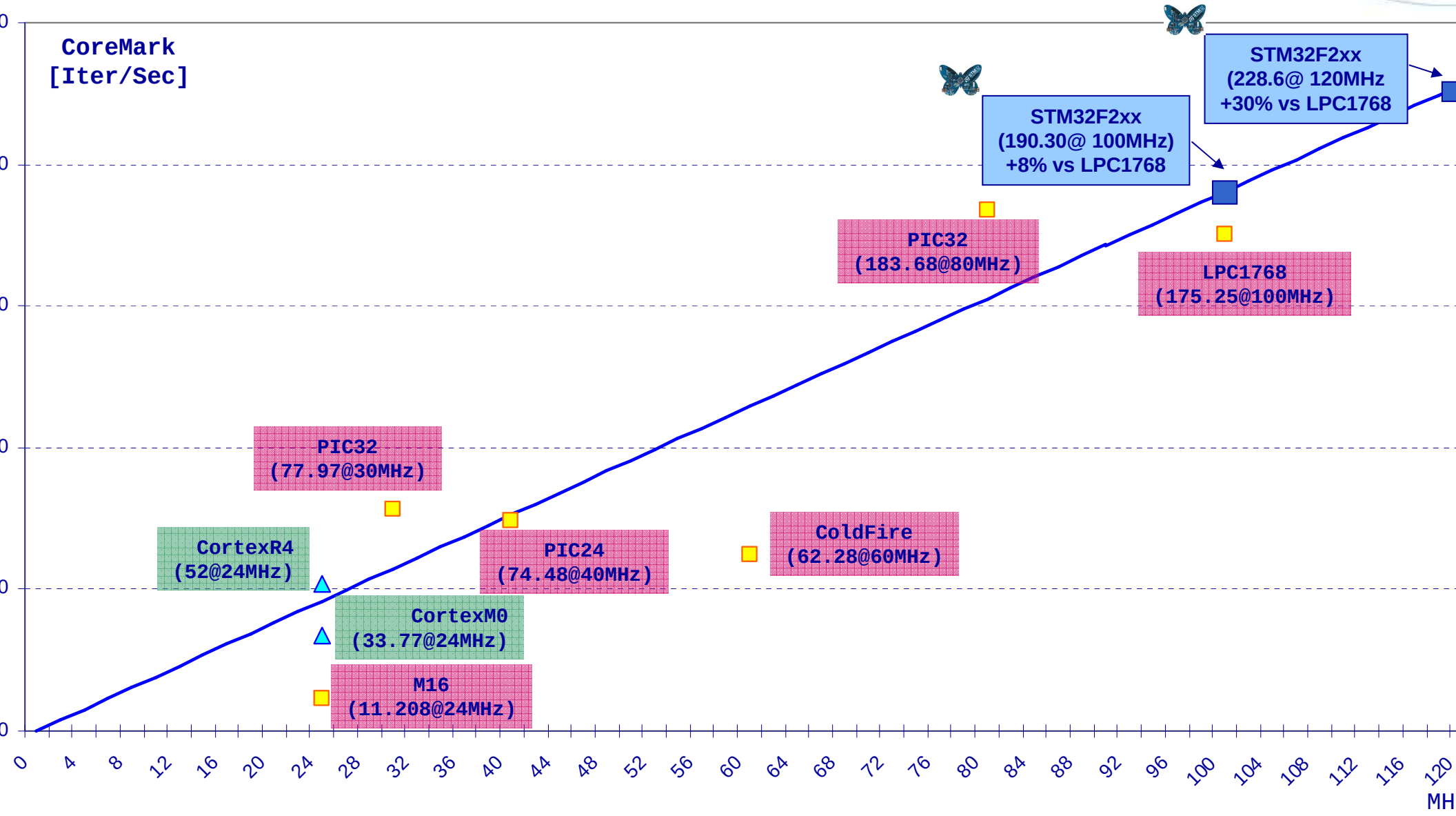
High-performance enhancements 1/2

- A performance that cannot be outperformed: 150MIPS at 120MHz
  - ➔ The F-2 memory accelerator allows to execute code with 0 wait-state at 120MHz, making the STM32 F-2 the fastest and ultimate Cortex M3 MCU on the market with 150MIPS at 120MHz.
  - ➔No Cortex M3 microcontroller can offer more performance in the future in terms or DMIPS/MHz. The only possible improvement will come from CPU frequency increase.

High-performance and technology enhancements 2/2

- Low dynamic power: with less than 23mA at 120MHz, who said high performance and low dynamic power consumption were not compatible?
  - **Less than 23mA** in run mode from flash at 120MHz with peripherals OFF (running CoreMark benchmark).
  - 150uA in Stop mode
  - < 1uA in VBAT mode and RTC ON, 3uA in standby mode with backup registers
  - 1.8V (min) to 3.6V (max) power supply.
  - Separate 1.2VDD input option (on BGA package) for the core: allows to benefit from external high efficiency switch mode regulator.
- 32-bit multi-AHB bus matrix for an efficient operation even when several high-speed peripheral work simultaneously.

EEMBC CoreMark 1.0 - Summary



TM32 F-2 Series product lines

l lines include up to:

- Up to1MB FLASH
- USART, SPI, I2C
- 2 x CAN
- Multiple 16-bit and 32-bit TIMERS
- dvanced timer x 2
- Dual DAC
- FSMC
- 2 x I2S
- MPU
- ETM
- Main Osc 3-16MHz
- Internal 8 MHz RC and 40 kHz RC
- Real Time Clock
- 2 x Watchdogs
- Reset circuitry
- to 12 channels DMA
- 80% GPIO ratio
- x12-bit ADC 0.5µs
- Temp sensor

+

STM32F207/217

120MHz CPU	Up to 128KB SRAM	USB 2.0 OTG FS	USB 2.0 OTG FS/HS	Camera interface	RNG + Encryption*	Ethernet IEEE1588

STM32F205/215

120MHz CPU	Up to 128KB SRAM	1x USB 2.0 OTG FS/HS	RNG + Encryption*

* Encryption block on STM32F217x and STM32F215x part #s only

STM32W

STM32W - IEEE 802.15.4 open platform





Smart energy

Home & building automation

Wireless sensor network

Healthcare

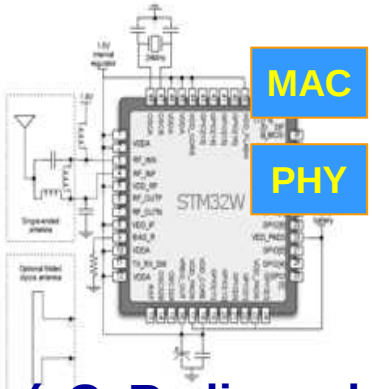
Consumer
Remote control
Home automation

Mesh networking / performance /secured
Stacks
or similar

ZigBee

Star / PtoP networks / Cost optimized

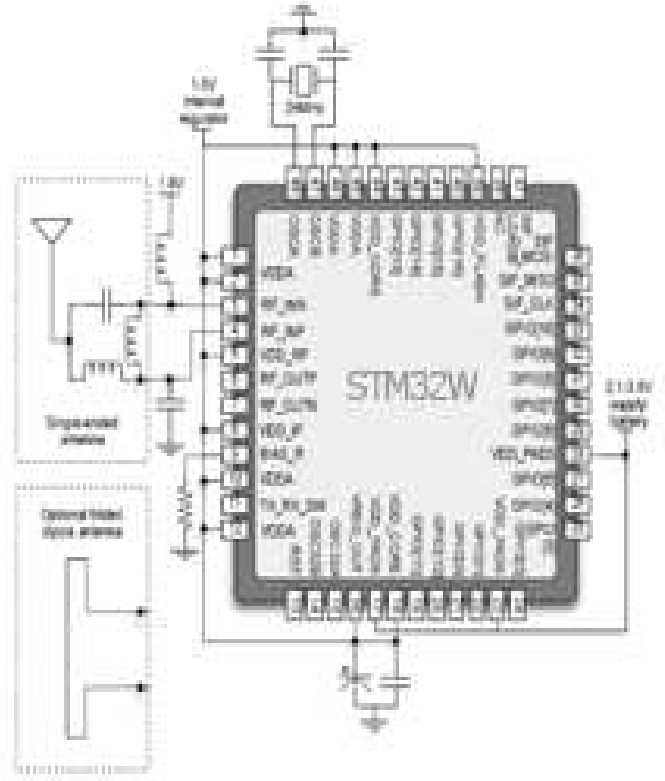
RF4CE or similar



A complete SOC solution (µC, Radio and FW)

STM32W – IEEE 802.15.4 radio/o

- **IEEE 802.15.4 / 2.4Ghz Radio**
  - Transmitter: 2-point direct synthesizer modulation
  - Receiver: low IF super heterodyne architecture
  - Digital BB DSP & MAC support
  - -100 dBm sensitivity and up to 7dBm output power
- **Microcontroller**
  - ARM Cortex-M3 core architecture
  - Embedded memory (eFlash 16kx64, SRAM 4kx16)
- **Networking**
  - Zigbee compliant PRO stack w/ some enhancements
  - 128 Kbytes Flash for stack & apps codes
- **Peripherals**
  - AES encryption HW accelerator
  - Debug channel via JTAG
  - USART, SPI, I2C, 24 GPIOs
- **Other**
  - Compatible with SN2xx series
  - QFN48 and QFN40 packages available



STM32W architecture overview

Fully IEEE 802.15.4 compliant radio

Power management

- Sleep mode <1µA

On-chip debug support

- Packet trace module interface enables remote monitoring of radio messages

Memory protection

- EmberZNet has unrestricted access to all areas of the chip
- The application runs in protected mode
- Stack overflow protection

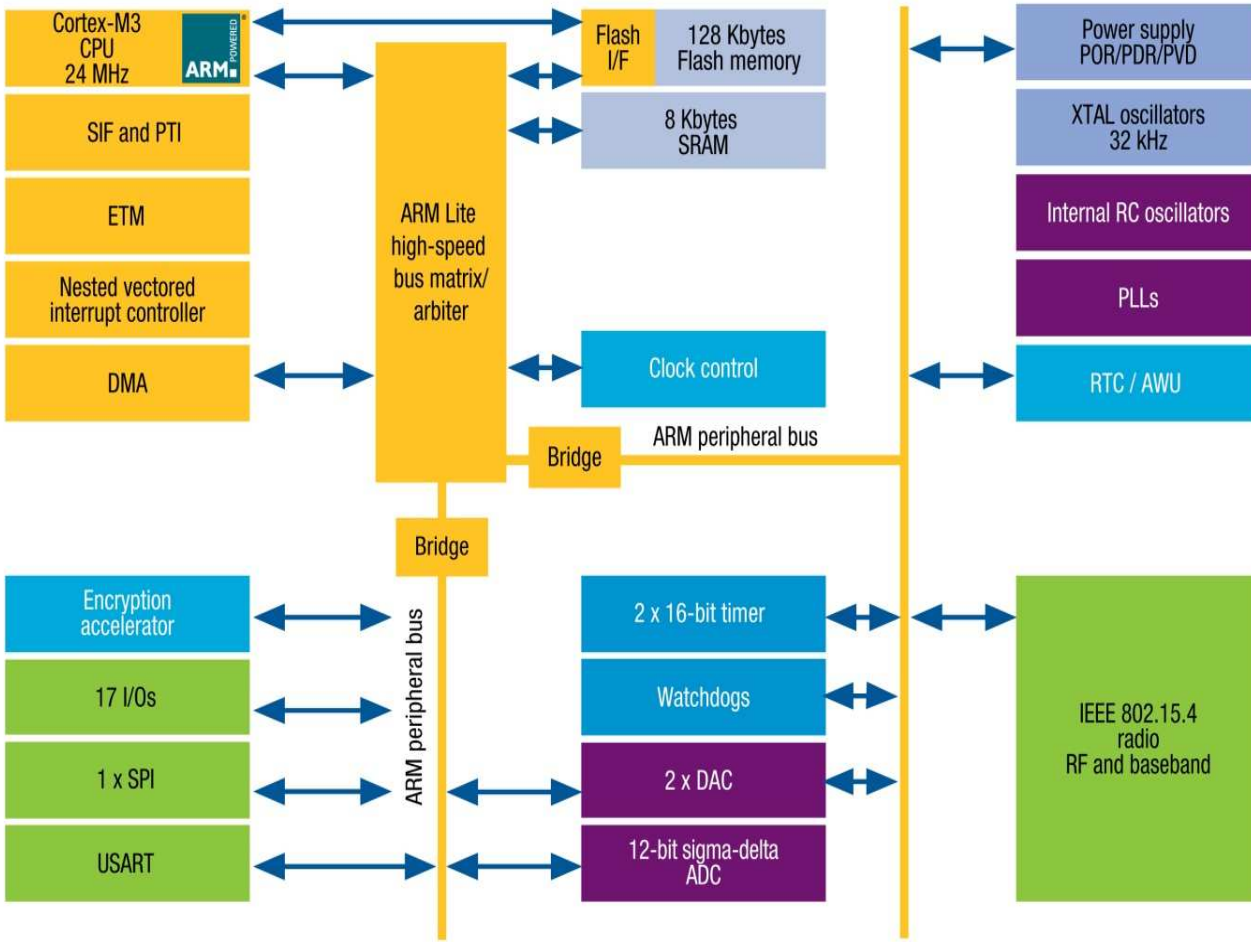
Encryption acceleration

- Application runs at full speed with strong encryption

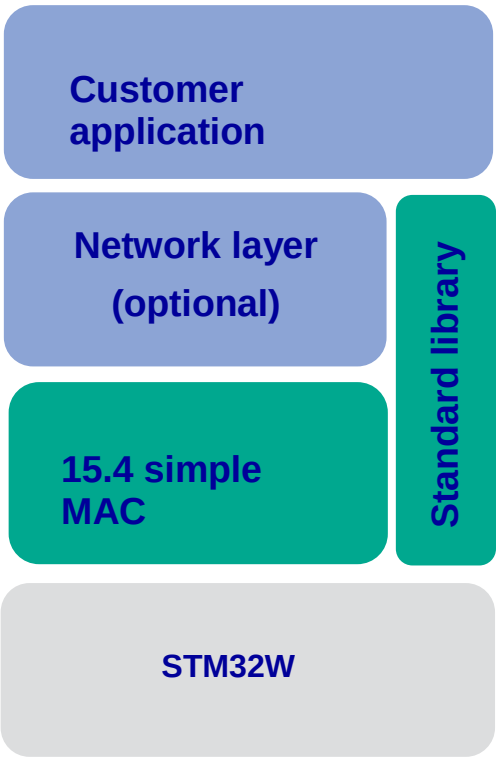
DMA improves data throughput

broad range of peripherals

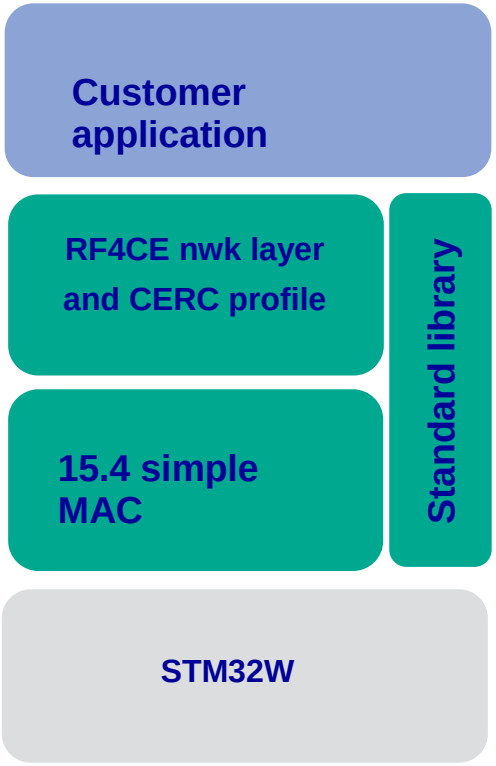
- USART/SPI/I²C/GPIO/ADC



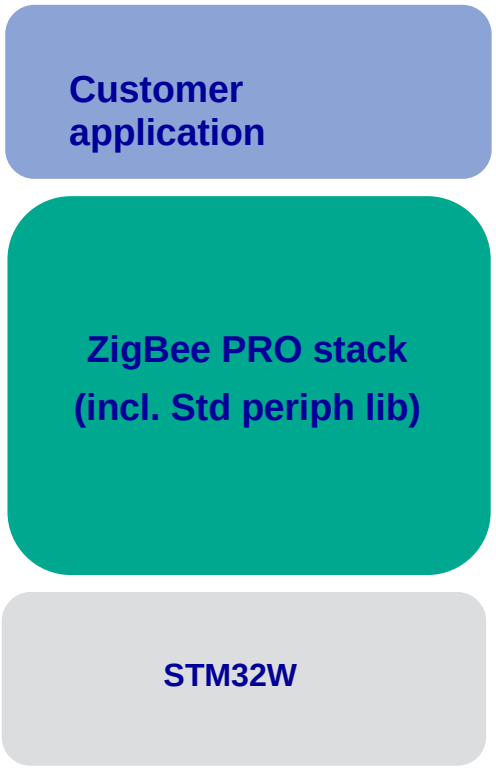
STM32W S/W libraries



Simple MAC application



RF4CE application



ZigBee application

Application profiles:

- Smart Energy (S
- Home Automatio (HA)
- Consumer (CER

STM32W in a nutshell

- **Highest performance**
  - Industry leading RF performance
  - Network performance – highest throughput, lowest latency for routing, security computations
  - Enhanced battery life by 25%+
- **Application code space**
  - ZigBee PRO stack 20%+ smaller than former products generation, plus architecture provides more usable flash
- **Power Consumption**
  - 1/3rd less active current than 250/260 series, combined with core efficiencies, results in longest battery life in industry
- **Industry standard/leading core**
  - High performance, standard tools, powerful debug capabilities
  - Part of largest ARM Cortex-M3 product family: STM32

STM32W starter kit

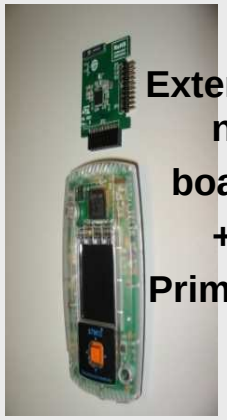
Network analyzer

Perytons

STLink + IAR compiler

x2

RF application board



Extension board + Primer 2

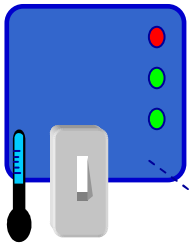
x4

RF application board

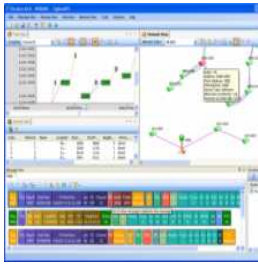
Extension kit

Developer kit

RF application board



Infrared



RF extension

Sniffer

Analyzer

USB

Integrated 2.4 GHz radio MCU enables efficient and low-cost wireless network implementation

STM32W is Zigbee certified platform (PRO Stack)

STM32W is ZigBee RF4CE certified platform

STM32W is IEEE 802.15.4 certified platform

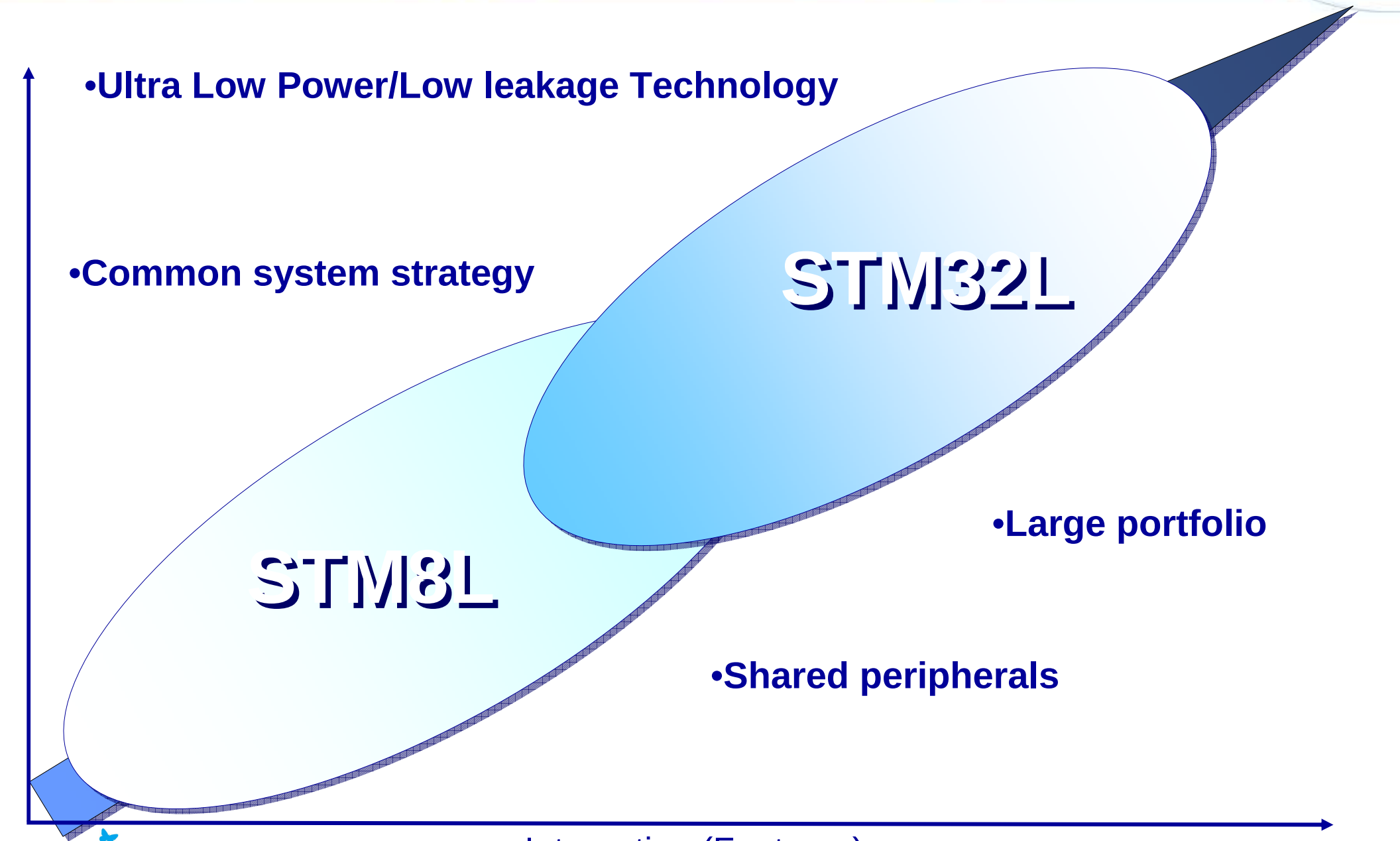
MMS – MCD
Product Line Management Team

STM8L-STM32L
Ultra Low power Continuum
Presentation

Ultra Low Power KEY messages

- **Commitment for Low power**
  - New 0.13µm Process designed especially for low power
  - Drastic improvement of all power consumptions – static and dynamic
  - Complete 8-bit to 32-bit platform development
- **Pure Efficiency**
  - High ratio Performance / Power consumption thanks to new architecture
  - 4 different Ultra Low Power modes (down to 170nA)
  - Fast wake up from Low power modes (4µs typ)
  - ADC and DAC functional down to 1.8V
  - Reprogramming capability down to 1.65V
- **Optimized integration**
  - Fully integrated in the 8-bit and 32-bit GP strategy
  - Offer extended features vs GP family – LCD, high end analog
  - Best combination price / set of peripherals
  - Fast time of development – full set of tools

8-32bit Ultra Low Power Continuum



STM8L/32L Targeted Applications

- **Medical**
  - Glucose meters
  - Insulin pumps
  - Diabetes cares
  - Blood pressure monitors
  - Cholesterol electronic monitors
  - Patient monitoring
  - Heart Monitors

- **Metering**
  - Electricity Meters
  - Gas Meters
  - Water Meters
  - Scales
  - Heat meters

- **Road Tolling**
  - Unique MCU for Tolling

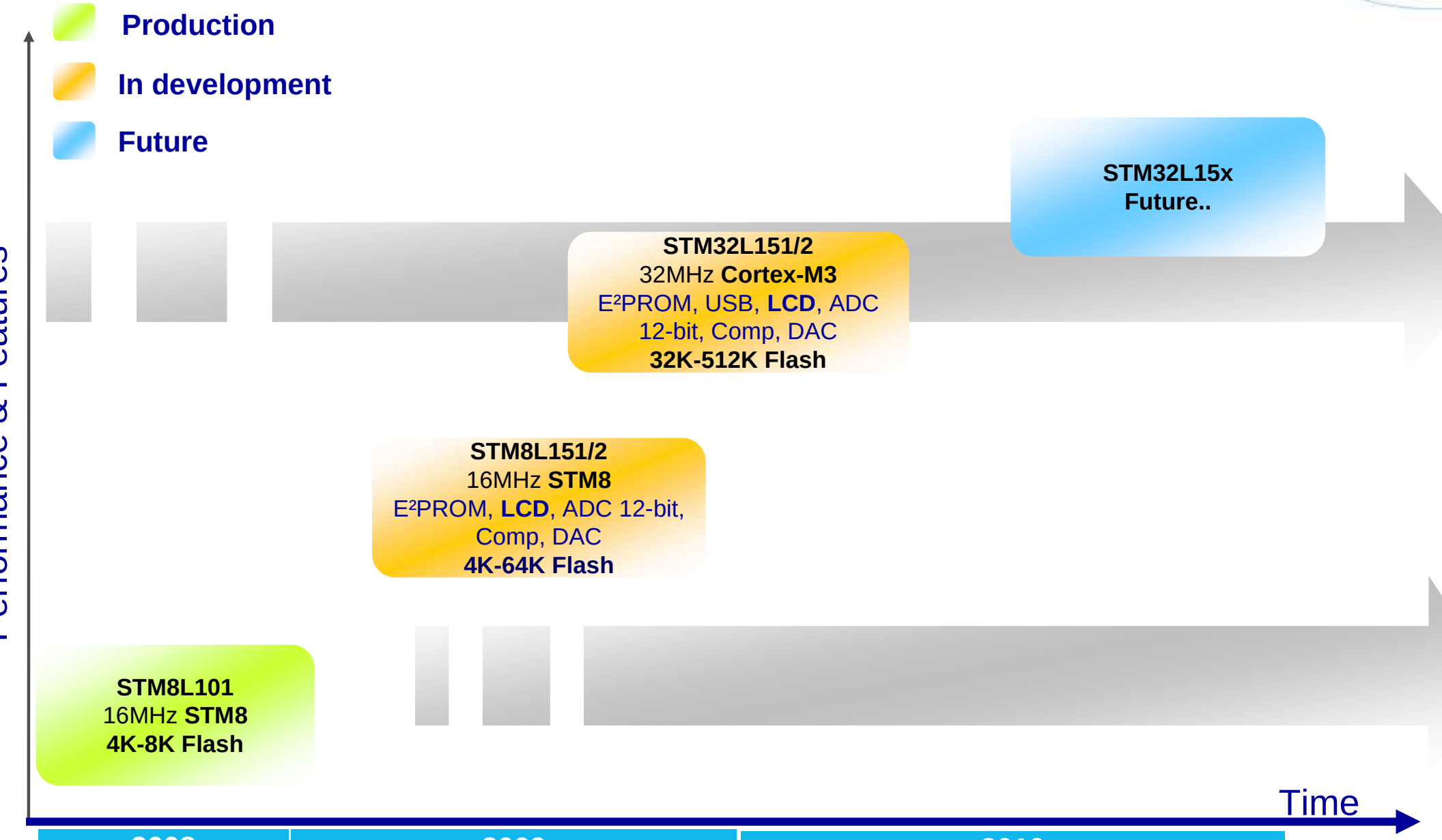
- **Alarm systems**
  - Central processor Unit
  - Wired Sensors
  - Wireless Sensors
  - Door Lock

- **GP portable device**
  - Mobile Accessories
  - 3D Mouse and remotes
  - Gamings
  - GPS watches,
  - Sport equipments
  - Games and toys

- **Power and energy**
  - Renewable Energy (Hydro/Solar/Wind)

- **Telecom**
  - Cordless Telephones

Low Power Roadmap



Ultra Low Power Continuum
First products availability

All familes include:

- Multiple com. Peripherals
  - USART, SPI, I2C
- Multiple 16-bit TIMERS
- Int RC 16 MHz and 37 KHz
- 2 x Watchdogs
- Reset circuitry
- x Comparators
- ebug functions

+

STM32L151/2

32MHz Cortex M3 CPU | Up to 128KB Flash | Up to 16KB SRAM | Main Osc Ext input 1-24MHz | Data E²PROM | Real Time Clock | DMA | LCD 8x40 | 1x12-bit ADC 1µs Temp sensor | 12-bit Dual DAC | MPU ETM | USB 2.0 FS

STM8L151/2

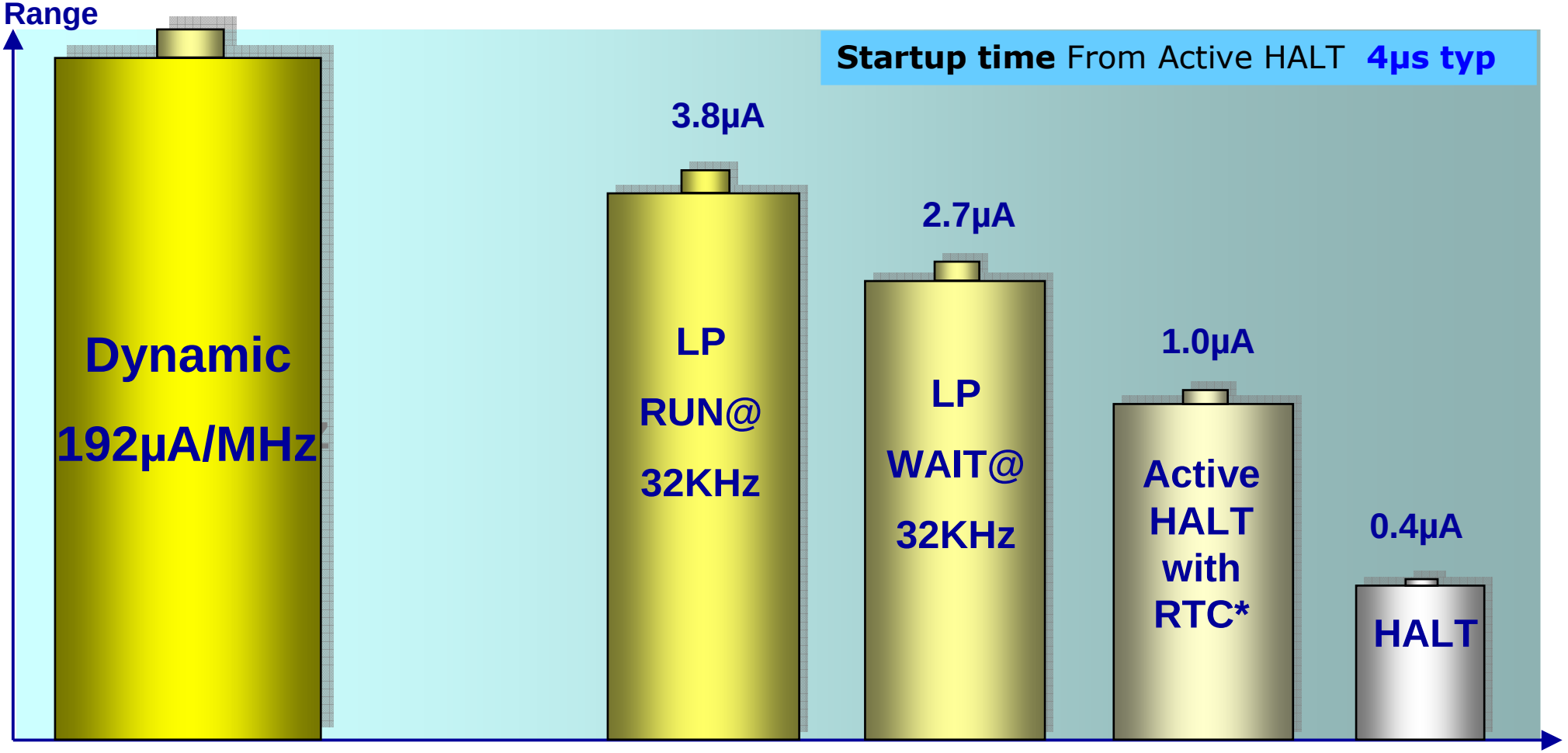
16MHz STM8 CPU | Up to 32KB Flash | Up to 2KB SRAM | Main Osc Ext input 1-16MHz | Data E²PROM | Real Time Clock | DMA | LCD 4x28 | 1x12-bit ADC 1µs Temp sensor | 12-bit DAC | 8-bit timer

STM8L101

16MHz STM8 CPU | Up to 8KB Flash | Up to 1.5KB SRAM | 8-bit timer

STM8L15x 32K – Low Power consumption values

p@25°C
d Range



- **LP Wait mode:** LSI/LSE ON, some Periph active, POR/PDR active, RAM ON and registers' content preserved
- **ACTIVE HALT mode:** All clocks OFF, POR/PDR active, RAM ON and registers' content preserved, RTC ON
- **HALT mode:** All clocks OFF, POR/PDR active, RAM ON and registers' content preserved, RTC OFF

***Also possible: RTC on LSI:** RTC feed by low speed internal RC, periodic wake up but no accurate calendar function*

STM8L Low Power Modes

- **Active-Halt Mode and Halt Mode**

- **2 new modes:**
  - **Low-power RUN**: **CPU is still running**
    - Execution is done from RAM with a low speed oscillator
    - LSE/LSI operates the CPU. Regulator in low-power mode
  - **Low-power WAIT**: RTC and select other peripherals actives
    - EEPROM is switched off and Regulator in low-power mode, CPU is stopped, RTC active

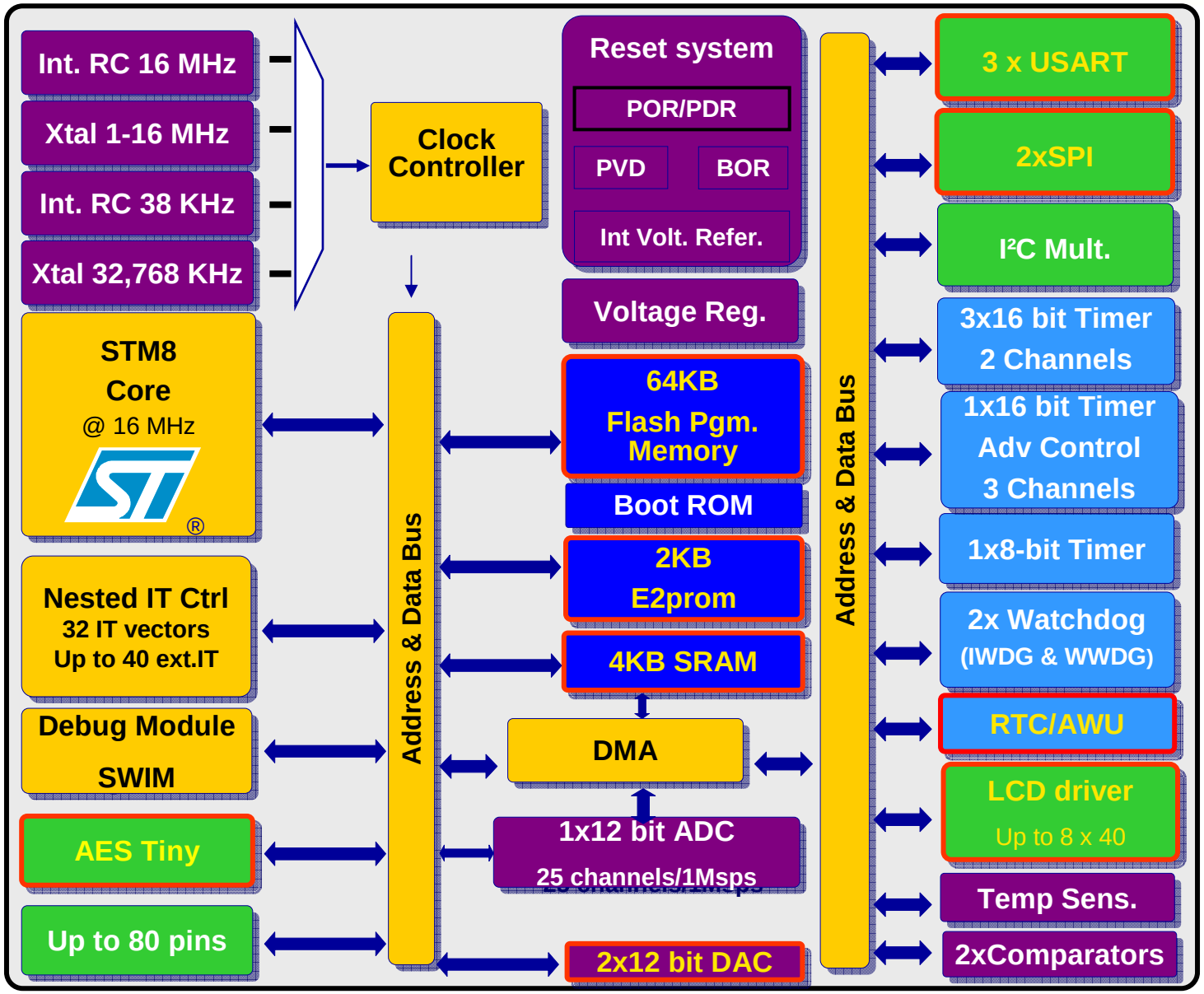
ow-Power Modes	Functions							Low-power modes names and consumption	
	CPU	Periphs	High-speed Osc	RTC Calendar	LSI	FLASH	RAM	STM8L Typical values @ 3V / 25℃	STM8L Typical values @ 3V / 85℃
LP RUN*	ON	Can be enabled	OFF	ON	ON	OFF	ON	5.4µA	6.8µA
LP WAIT*	OFF	Can be enabled	OFF	ON	ON	OFF	ON	3µA	4.4µA
CTIVE HALT w/full RTC*	OFF			ON	ON	OFF	ON	1.0µA	1.4µA
CTIVE HALT w/RTC on LSI				OFF	ON	OFF	ON	0.8µA	1.2µA
HALT				OFF	OFF	OFF	ON	0.35µA	1µA

*STM8L15x only

Roadmap: STM8L152 64K Block Diagram

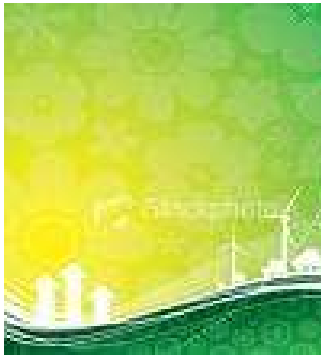
New vs 32K

- Up to 80 pins
- 3xUSART
- 2xSPI
- 8x40 segments LCD
- More SRAM/E²PROM
- Dual DAC
- Improved RTC
- AES Tiny



MMS – MCD

STM32L Family



STM32L152 128K Block Diagram

Core

- ARM Cortex-M3 Core@32MHz Fcpu
- -40 to 85℃
- 1.8V to 3.6V range (down to 1.65V at power down)

Memory

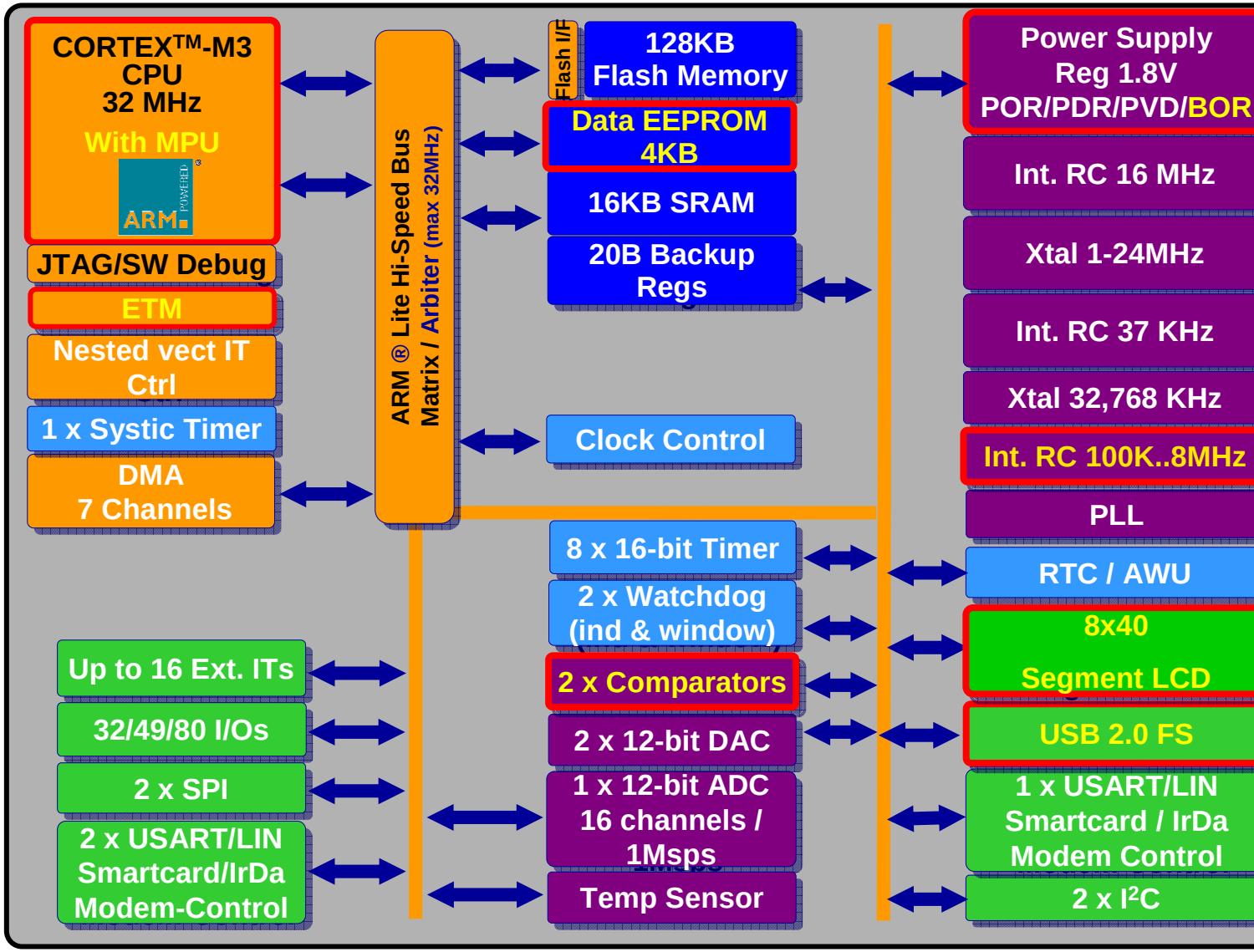
- Up to 128K Flash, 16K
- SRAM, 4K data EEPROM

Features

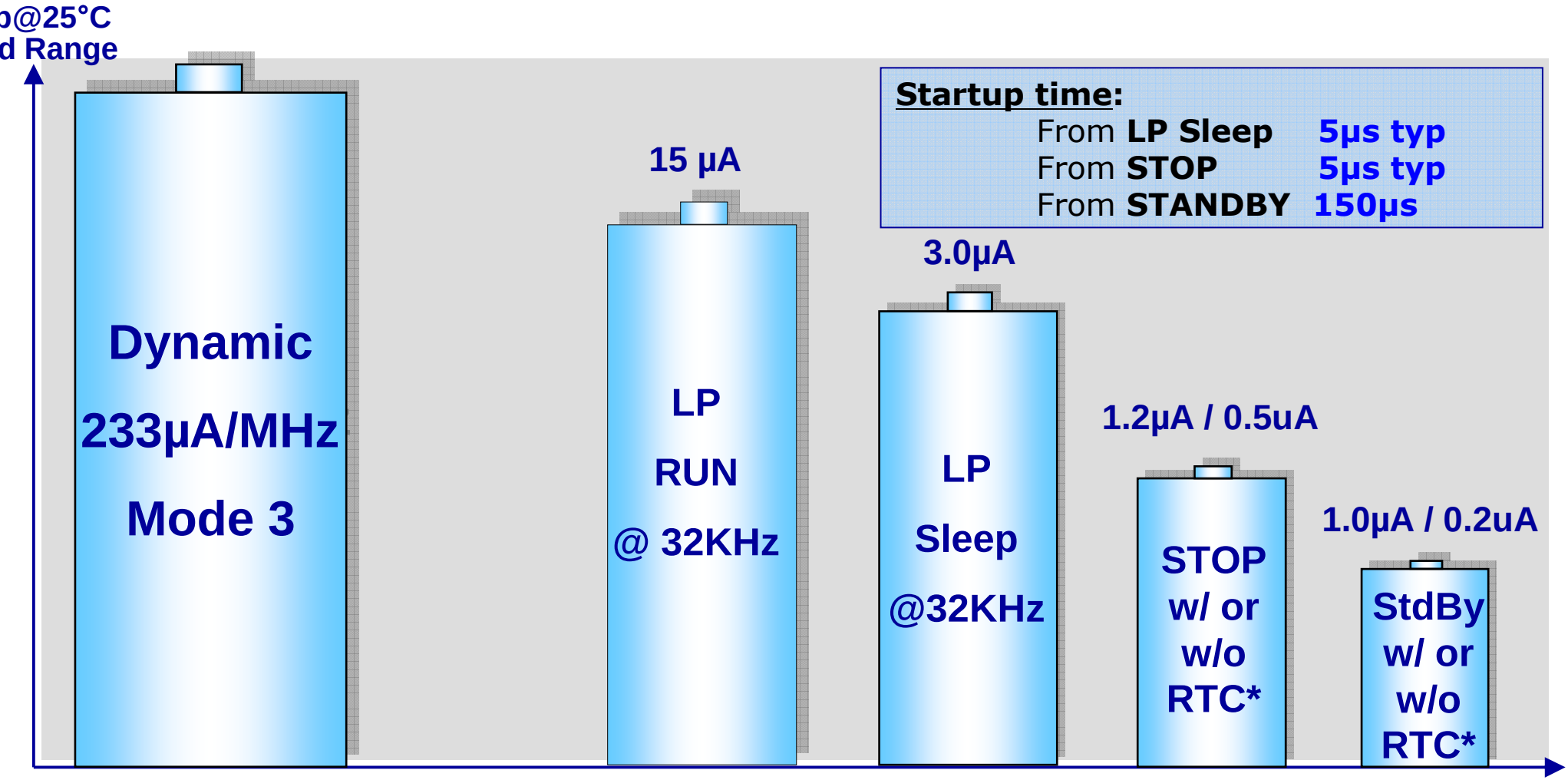
- 4 Ultra Low Power modes
- +/- 1% Internal RC accuracy
- Low power consumption
  - 0,17µA Standby
  - 1.2µA Stop (with RTC)
- Safe Reset System (POR/PDR, BOR, PVD)
- High ratio High Sink/Source I/Os (20mA)

Packages

- 36 pins QFN
- 48 pins LQFP/QFN
- 64 pins LQFP/BGA
- 100 pins LQFP/BGA



STM32L15x 128K – Low Power consumption values



- **LP Sleep mode:** MSI ON, some Periph active, POR/PDR active, RAM ON and registers' content preserved
- **STOP mode:** All clocks OFF, POR/PDR active, RAM ON and registers' content preserved
- **STANDBY mode:** All clocks OFF, POR/PDR active, RAM OFF, Backup registers preserved

- ***Also possible: RTC on LSI =>** RTC feed by low speed internal RC, periodic wake up but no accurate calendar function*

STM32L Low Power modes

- **STOP Mode and Standby Mode**

- **2 new modes:**
  - **Low power RUN**: **CPU is still running**
    - Execution is done from RAM with a Low Speed Oscillator
    - MSI operates the CPU. Regulator in Low Power mode
  - **Low Power SLEEP**: keep RTC and chosen other peripherals actives
    - EEPROM is switched off and Regulator in Low Power mode, CPU is stopped, RTC active

Low Power Modes	Functions							Low power modes names an consumptions	
	CPU	Periphs	high speed Osc	Medium Speed OSC	RTC Calendar	LSI	RAM	STM32L Typical values @ 3V / 25°C	STM32L Typical valu @ 3V / 85°
LP RUN	ON	Can be enabled	Can be enabled	ON	ON	ON	ON	15µA	TBD
LP SLEEP	OFF	Can be enabled	OFF	OFF	ON	ON	ON	3.0µA	TBD
TOP w/full RTC	OFF				ON	ON	ON	1.2µA	4.5µA
TOP w/ RTC on LSI					ON	ON	ON	1.0µA	4µA
TOP w/o RTC					OFF	ON	ON	0.5µA	3µA
ANDBY w/o RTC					OFF	OFF	OFF	0.2µA	1.2µA

Security and Safety

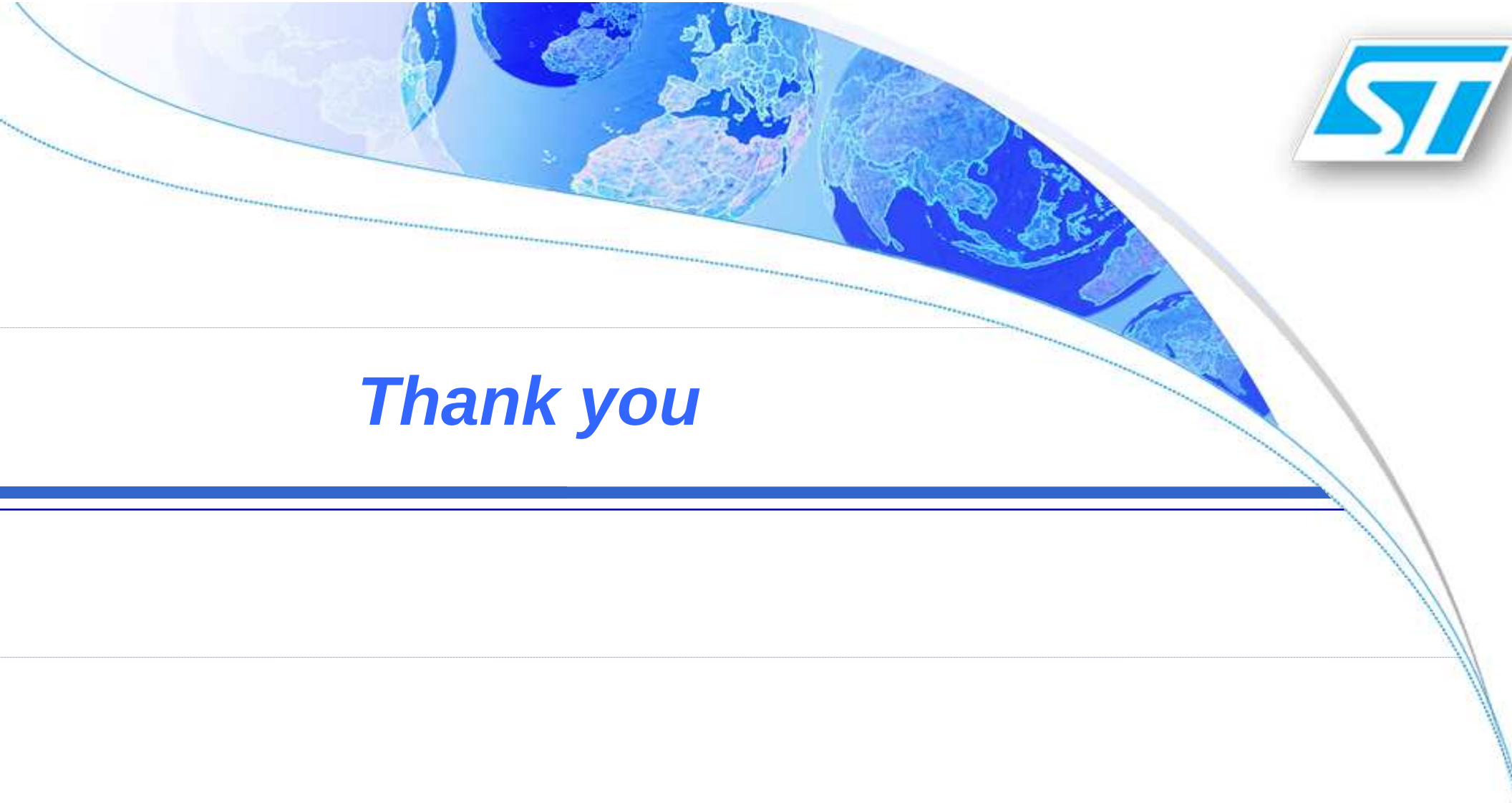
- Reset circuitry
- Proprietary Code Protection**
- Dual watchdog
- Back-up clock
- Anti-tamper*
- Flash protection
- Unique ID
- CRC 32-bit*
- Dual Stack pointer
- Back-up registers*
- I/O locking*
- Supply monitoring
- JTAG fuse*
- Memory Protection Unit*
- NV memories with ECC

*: STM32L only ** STM8L only

Some IPs deserve particular attention : LCD

	STM32L	STM8L
Common x Segments (pixels)	Up to 8x40(320) or 4x44(176)	Up to 4x28(112)
Duty	Static, 1/2, 1/3, 1/4, 1/8	Static, 1/2, 1/3, 1/4
Bias	Static, 1/2, 1/3, 1/4	Static, 1/2, 1/3
Data RAM	10x32bits for pixel active/inactive Double buffer	14x8bits for pixel active/inactive Interrupt driven refresh
Blinking	1, 2, 3, 4, 8 or all pixels at programmable frequency	1, 2, 3, 4 or all pixels at programmable frequency

- High Flexibility Frame Rates
- Configurable in low power modes:
- Low Power Waveform to reduce consumption
- Internal Step-up Converter - Need a single decoupling capacitor
  - Can be bypassed to use external LCD Voltage
- Contrast Control whatever power supply:
- Unused segments and common pins can be used as I/O



Thank you