CECport 中电港

QCA4010/2/4
Advanced Wi-Fi MCU for IoE

August, 2015

QCA401x – Best WiFi MCU

Enable variety of use cases with low energy consumption Wi-Fi

New

More Interfaces
Integrated ADC (8-channels)
8 x PWMs
3 x UART
2 x I2C, 2xI2S, 2xSPI

New Sep'15

Cloud

S-Flash

SPI

Battery or **3.3V**
Direct Battery Connection (2.7V~3.6V)

New

Bat. Reg.

apps

QCA401x

Antenna
Rx SW Diversity

UART connect

Connect to the Cloud
- Direct connection of device to the clou[d]

Code on chip (>400KB or >800KB free)
- Rich applications directly on chip

Larger Memory

Dual-Band w/ Antenna Diversity
- Whole-home coverage

Easier to Use
- Support AllJoyn.JS
- HomeKit Support

Sensors/Ctrl.

Stronger Security
Integrated HW crypto engine
- Secure Boot
- Secure Suspend / Resume
- Application Encryption/Decryption

Secure OTP Memory (read/write protect)
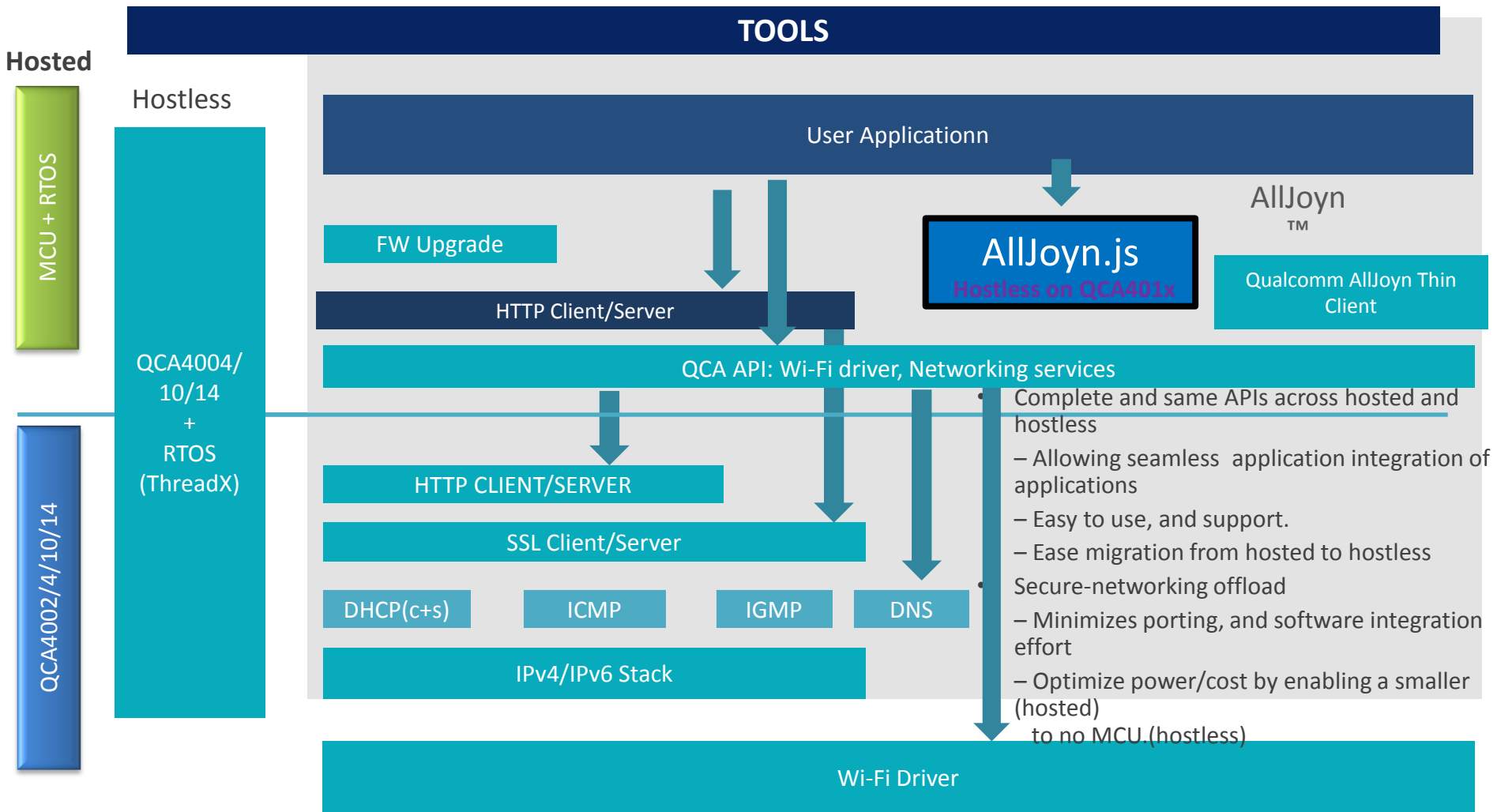- Device Authentication
- Code Authentication

New

P/N	Description
4010	2.4GHz DRQFN 9x9
4012	2.4G/5GHz DRQFN 9x9
4014	2.4GHz FOWLP 5.5x5.5

Commercial Temperature range 0C – 85C (case)
Extended Temperature range -40C – +115C (case)

Product Comparison - QCA401x vs. QCA400x

	QCA400x	QCA401x
Wireless Standards	• Dual-band (2.4GHz and 5GHz) 802.11a/b/g/n (HT20/40), 1x1, internal PA=+20dBm, RX diversity	Same Wi-Fi
Integrated MCU	Single Tensilica CPU Wi-Fi, IP stack, ThreadX & runs customer applications	Same Tensilica CPU HW Crypto Engine
Internal Memories	RAM: 448KB, ROM: 768 KB, OTP: 1KB, External serial flash support	RAM: 1MB or 1.5MB, ROM: 1.25MB, OTP: 1KB
HW interfaces	• 1 SPI Master (36MHz) + SPI host intf • 1 I2C Master/slave • HS UART (3Mbps), Debug UART • 1-2 I2S Master/slave (audio), USB 2.0 • Multiplexed GPIO's	• 2 x SPI Master (36MHz) + SPI host intf • 2 x I2C Master/Slave • HS UART (3Mbps), 2 x low speed UART • 2 x I2S Master/slave (audio), USB 2.0 • SDIO 2.0 Slave interface • 8 channel ADC (12 bit 1MS/s) w/ HW average • Integrated keypad controller (8x8) • 8 independent HW PWM • More dedicated GPIOs on DRQFN116 pkg
Power KPI	• Rx < 65mA, Tx@5dbm <160mA, IEEE PS Sleep <130uA	Similar to QCA400x, Improve RTC for aggressive power saving (up to 20% more sleep time for some use cases)
PKG	7x7mm QFN-56Pin, 8x8mm QFN68	9x9mm DRQFN-116pin, 5.5x5.5mm FOWLP
Target Schedules	Mass production now	ES: Apr'15, DRQFN CS: Jul'15, FOWLP CS: Dec'15

QCA400x/401x Hosted and Hostless Software Architecture

Hosted

MCU + RTOS

QCA4002/4/10/14

Hostless

QCA4004/
10/14
+
RTOS
(ThreadX)

TOOLS

User Applicationn

AllJoyn
™

FW Upgrade

AllJoyn.js
Hostless on QCA401x

Qualcomm AllJoyn Thin Client

HTTP Client/Server

QCA API: Wi-Fi driver, Networking services

HTTP CLIENT/SERVER

SSL Client/Server

DHCP(c+s)   ICMP   IGMP   DNS

IPv4/IPv6 Stack

Wi-Fi Driver

- Complete and same APIs across hosted and hostless
  – Allowing seamless application integration of applications
  – Easy to use, and support.
  – Ease migration from hosted to hostless
- Secure-networking offload
  – Minimizes porting, and software integration effort
  – Optimize power/cost by enabling a smaller (hosted)
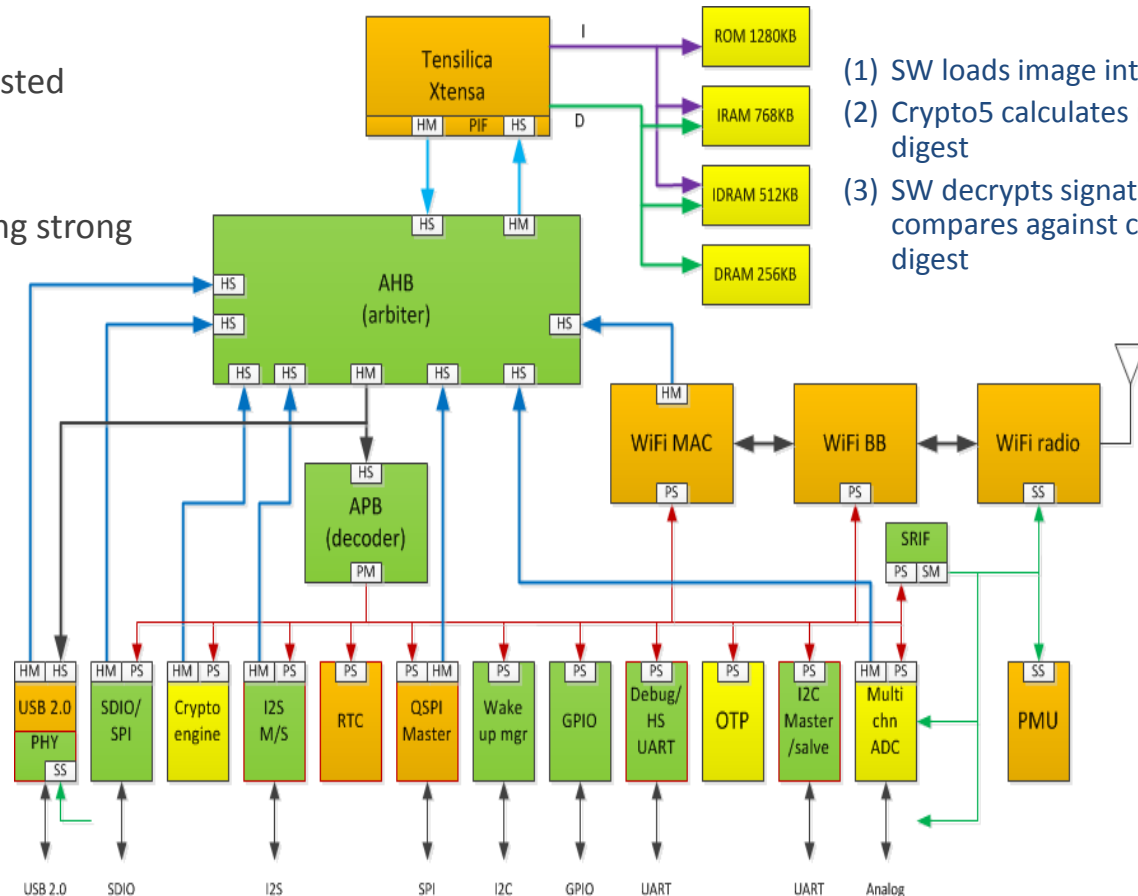   to no MCU.(hostless)

QCA400x/401x Secure Boot

- Addresses SW authenticity and integrity concerns
- Only allows execution of trusted code
- Root of trust stored in HW
- SW binary image signed using strong public key cryptography
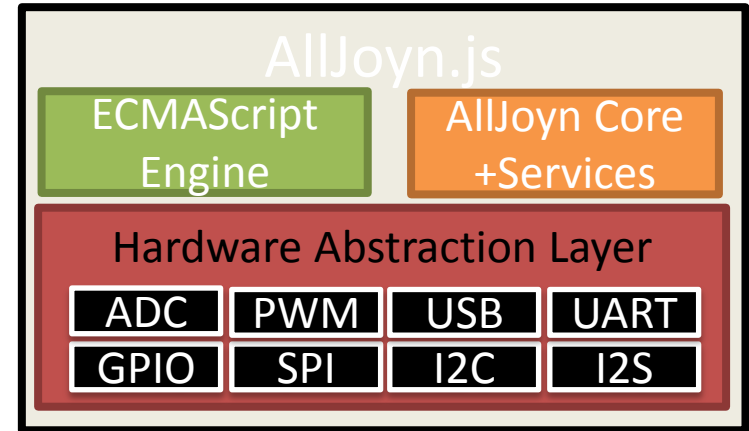
①: **normal boot**
①+②: **secure boot**

(1) SW loads image into IRAM
(2) Crypto5 calculates message digest
(3) SW decrypts signature and compares against calculated digest

Support for AllJoyn.JS - Embedded JavaScripts

Value Proposition

- Simplify IoE application development
  - Familiar to application developers
  - Simplified AllJoyn setup and access to AJ service frameworks
  - Simplified access to hardware (GPIO, SPI, I2C, PWM, ADC, DAC)
    - Device drivers can be written in C or ES and called from ES
- Device/CPU/OS agnostic
  - Portable across devices
  - Make application SW development agnostic to CPU and OS selection
- Optimized for embedded IoE devices

AllJoyn.js

ECMAScript Engine	AllJoyn Core +Services

Hardware Abstraction Layer

ADC	PWM	USB	UART
GPIO	SPI	I2C	I2S

- An Embeddable ECMAScript Runtime integrated with the AllJoyn Connectivity Framework for Small IoE Devices.
- AllJoyn + JavaScript
  - ECMAScript (JavaScript) language interpreter and JIT compiler integrated with AllJoyn connectivity framework
- Native code support
  - Easily integrate native code (C/C++) with ES into compiled executable for target device
- High-level programming constructs
  - Portable
  - Built-in regular expression engine
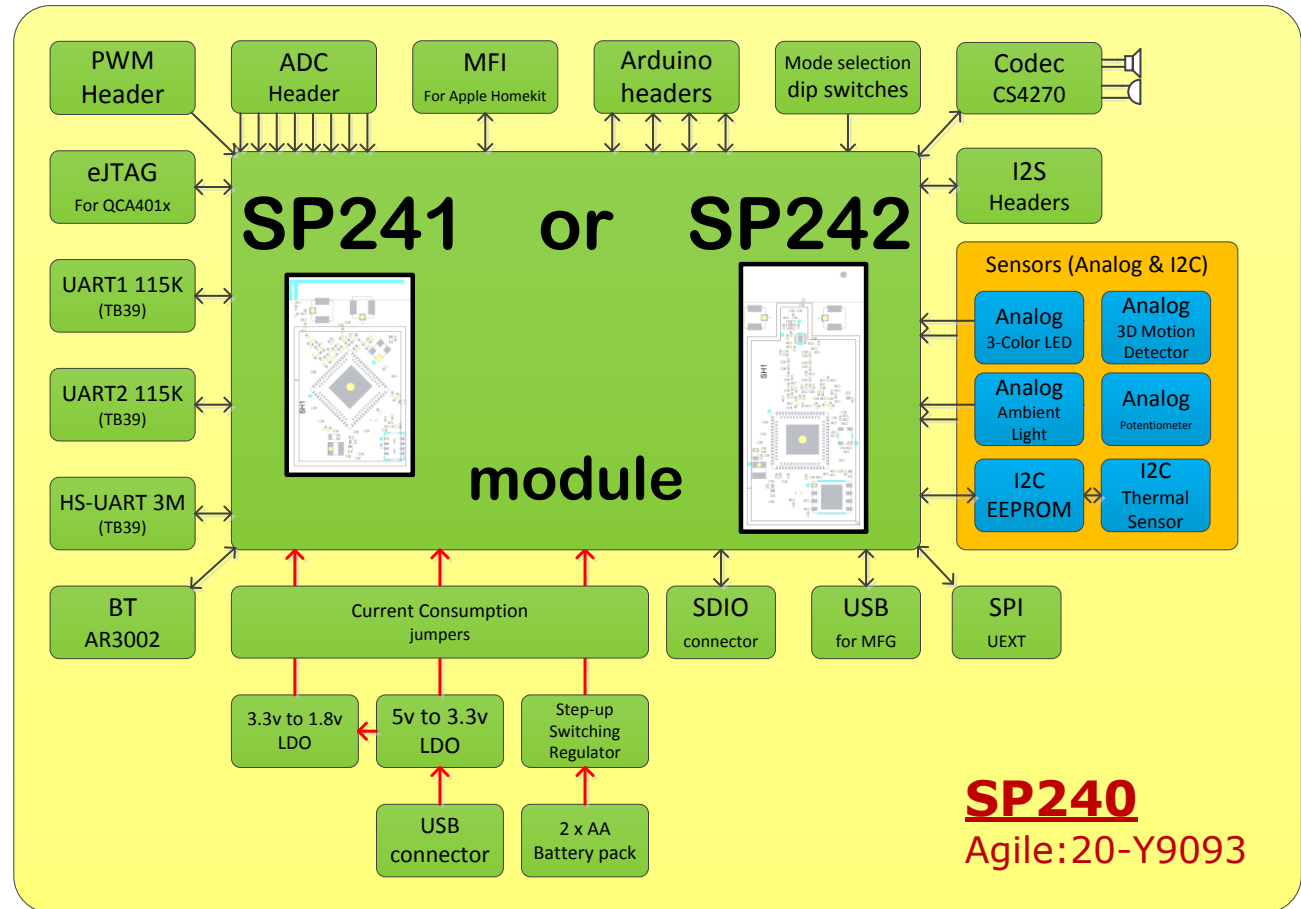 - Built-in Unicode support
- Open Source

QCA401x ROM/RAM SW Breakdown

Functions	RAM Size	Comments
Application SDK Shell, patches, application library w/ Qualcomm APIs (QAPIs)	~400KByte	R3.3 equivalent features + ADC & PWM drivers
Alljoyn SW - 15.04 and early versions	~100KB	
Reserved for new features	~100KB	
Customer application SW	~400KB (1MB version) or ~800KB (1.5MB version)	The exact RAM space available for customer applications may vary depending on all the Wi-Fi and AllJoyn features needed for commercialized product

Functions	ROM Size	Comments
Operating System ThreadX TCP/UDP/IP Network Services Wi-Fi Networking Wi-Fi / Networking Security	1MB	RTOS + Wi-Fi + Networking + Security

QCA401x Reference Design - SP240 Mother Board (for SP24x Modules)

- Host Interfaces
  - USB (for manufacturing)
  - UART
  - SDIO
  - SPI
  - Hostless
- Peripherals
  - 8 x PWM
  - GPIO Header
  - 8 x ADCs Header
  - UARTs
  - BT
  - Connection to Arduino shields
  - Connection to Freedom boards
- Sensors
  - Analog
    - 3-Color LED
    - Ambient Light
    - Potentiometer
    - 3D Motion Detector
  - I2C
    - EEPROM
    - Thermal Sensor
- Audio
  - 2 x I2S headers
  - Codec interface
- Debug
  - JTAG
  - Current Consumption

| PWM Header | ADC Header | MFI For Apple Homekit | Arduino headers | Mode selection dip switches | Codec CS4270 |

eJTAG For QCA401x

SP241 or SP242

I2S Headers

UART1 115K (TB39)

UART2 115K (TB39)

HS-UART 3M (TB39)

module

Sensors (Analog & I2C)
- Analog 3-Color LED
- Analog 3D Motion Detector
- Analog Ambient Light
- Analog Potentiometer
- I2C EEPROM
- I2C Thermal Sensor

BT AR3002

Current Consumption jumpers

SDIO connector

USB for MFG

SPI UEXT

3.3v to 1.8v LDO | 5v to 3.3v LDO | Step-up Switching Regulator

USB connector | 2 x AA Battery pack

SP240
Agile:20-Y9093

CECport 中电港   www.cecport.com   为客户服务 与伙伴分享

Thank You
Win-Win