SimpleLink™ Wi-Fi® Gen2 CC3220/CC3120 Overview

Raising the Bar

LOW POWER

SECURTY

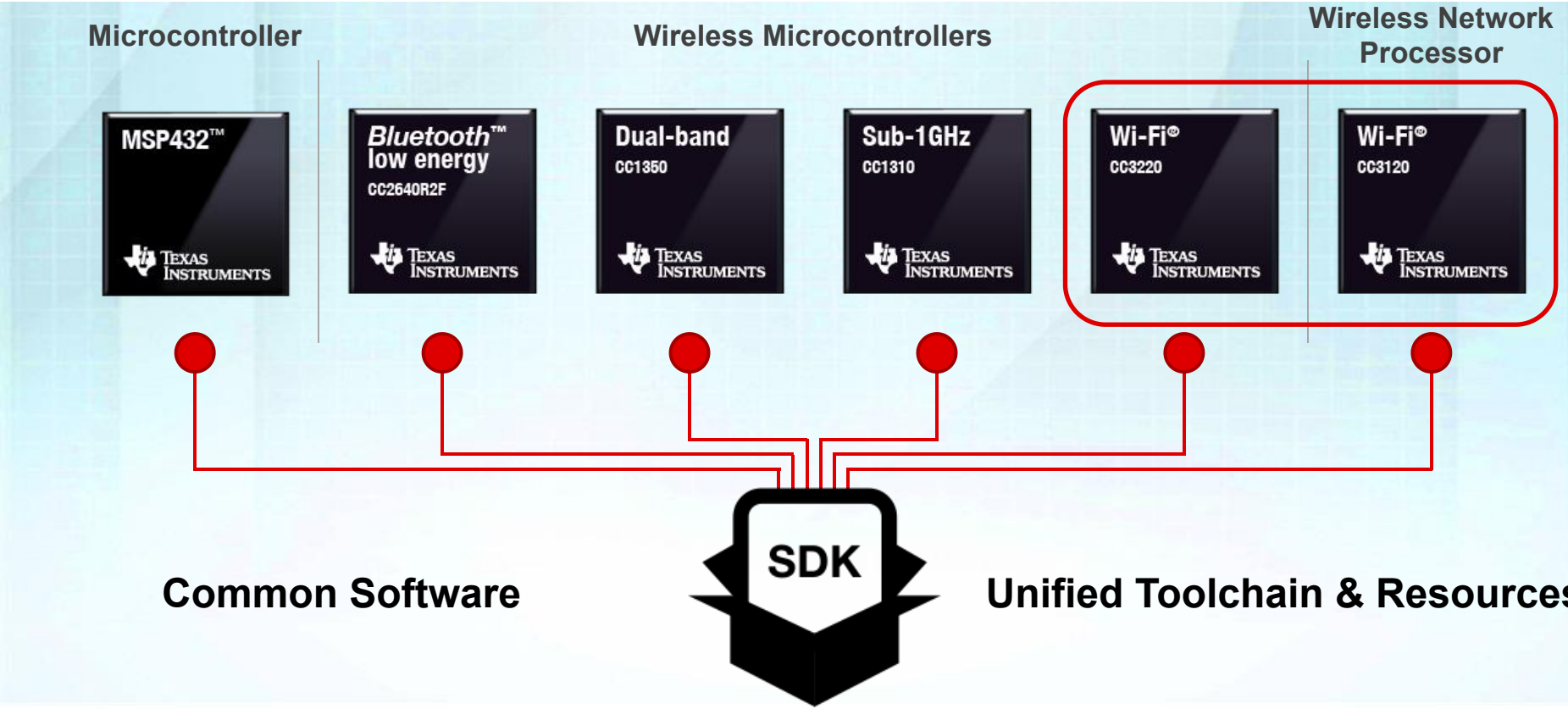
TIME TO MARKET

30.7B *connected devices by 2020,* ***75.4B*** *by 2025*

Top IoT concerns…

Sources: IHS Markit and Bain & Company

New SimpleLink™ MCU platform



SimpleLink™ Wi-Fi® Wireless MCU CC3220

Low Power, Advanced Security, Easy Integration

Applications MCU

Physically separate MCU and memory, dedicated to the user's applications.

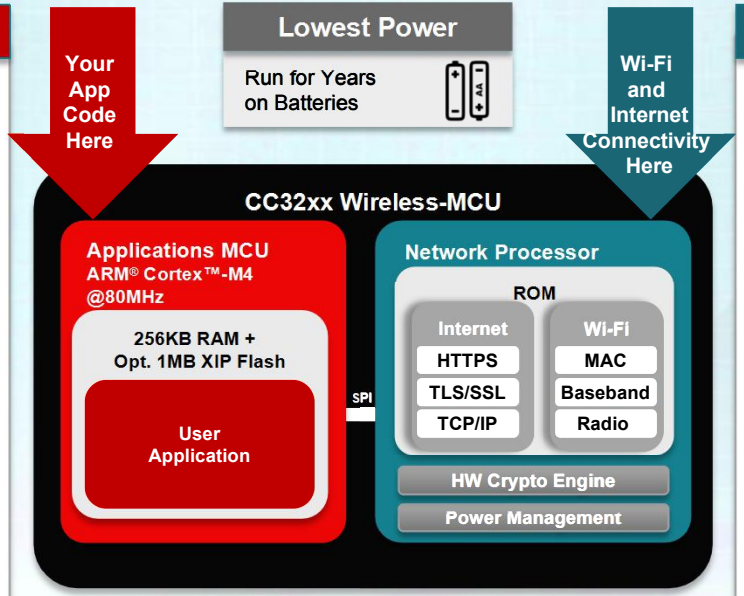
Programmable Applications MCU
- Peripheral drivers and Libraries
- Supports no-OS or TI-RTOS/Free-RTOS

Application-dedicated Memory
- **256KB RAM**
- Additional **1MB XIP Flash** (Opt.)

Rich Set of Peripherals & Timers

27 I/O pins with flexible muxing options
- 2x UART
- 1x I²C
- 1x SPI
- 1x SD
- 1x McASP with I2S or PCM
- 4-channel 12 bit ADC
- 8-bit parallel camera
- Timers & PWM

Enhanced Features
- Rich multi-layer set of **security features,** within a single chip, to help protect **IP** and **data**
- HW Crypto engines: **AES, DES, SHA/MD5, CRC**
- Enabling Applications with **HomeKit** Technology
- OTA support
- SimpleLink™ **Connected MCU** Platform support



Multi Layered Security Features

Network Processor

The network processor offloads networking and internet tasks from the application MCU

Wi-Fi Core
- 802.11 b/g/n at 2.4GHz
- Modes: STA, AP, Wi-Fi Direct®
- Wi-Fi Security: WEP, WPA, WPA2
- Provisioning: AP mode, SmartConfig™, WPS, WAC*
- Throughput: up to 16Mbps

Built In Power Management
- Integrated DC2DC
  - V_{Bat}: **2.1** V to **3.6** V
  - Pre-regulated:**1.85** V
- Low power modes
  - Hibernate (**4.5uA**)
  - Low power deep sleep (**135uA**)
  - Rx beacon listen (**37mA**)

Internet & Application Protocols
- Embedded webserver (HTTPs)
- Supports IPv4 & IPv6 TCP/IP Stack
- **16** Sockets (**6** TLS v1.2 / SSL 3.0)

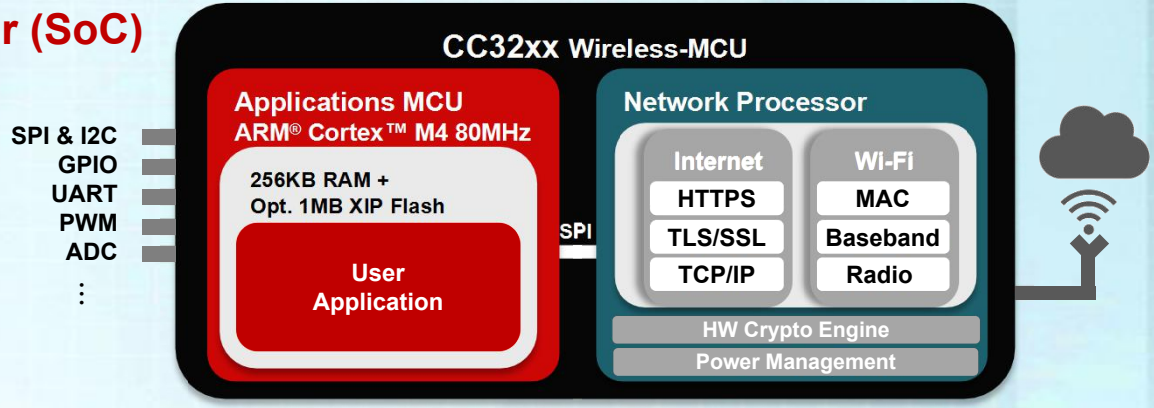
Powerful HW Crypto Engine
- Enables fast secured Wi-Fi and internet connections within 200mSec

Industrial Temp
- Supports -40⁰C to +85 ⁰C

SimpleLink™ Wi-Fi® Family

Simple Integration, Powerful Features

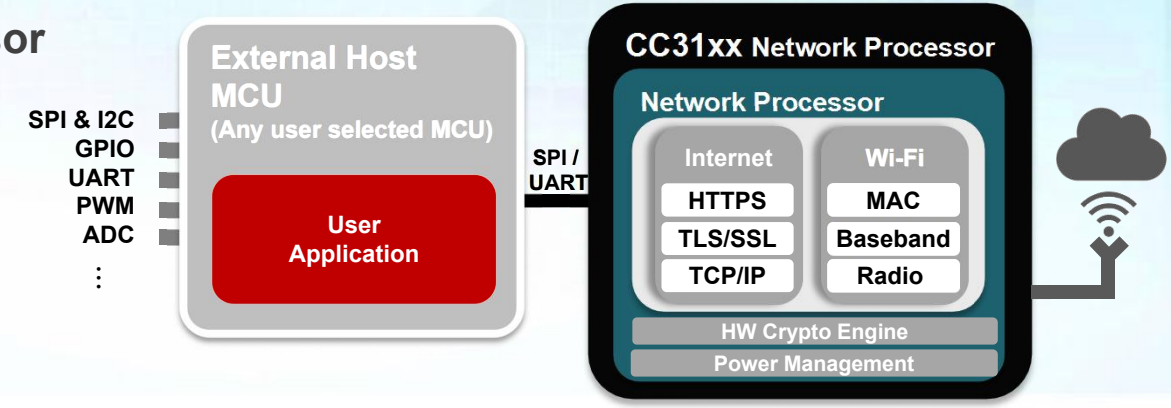
CC32xx - Wireless Microcontroller (SoC)



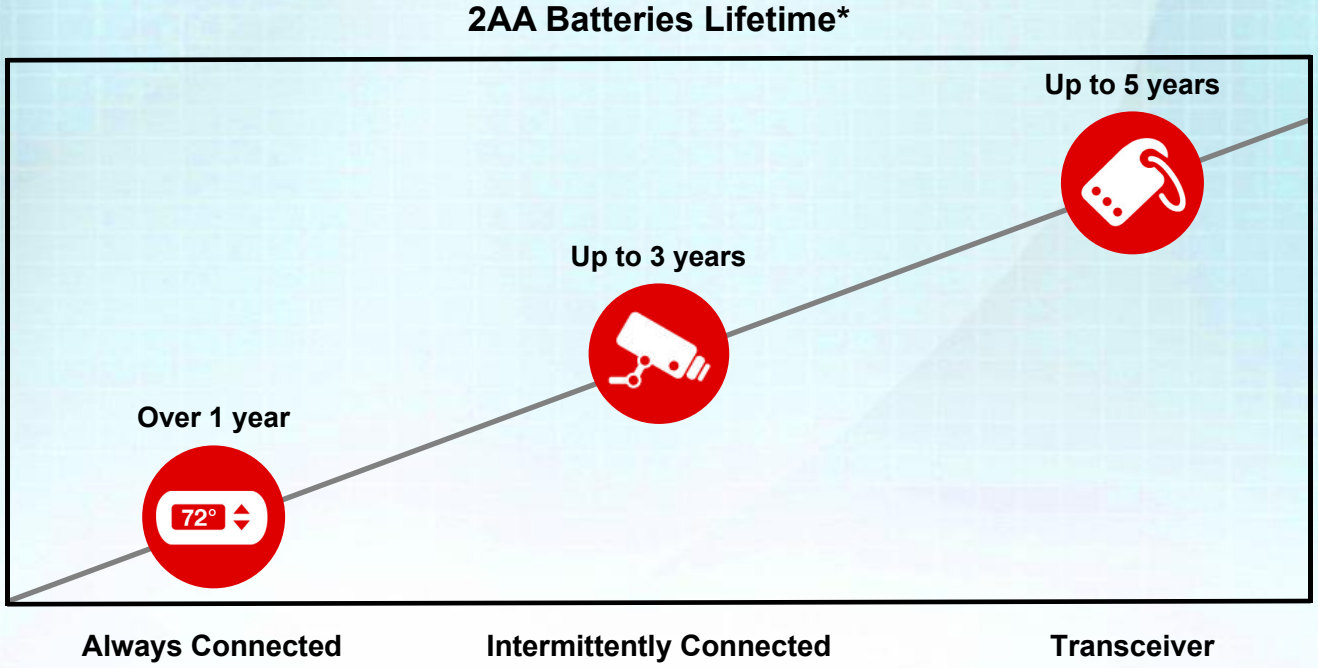
Pin2Pin Compatible

Pin2Pin Compatible

CC31xx - Wi-Fi Network Processor



Lowest power enables Wi-Fi for new applications



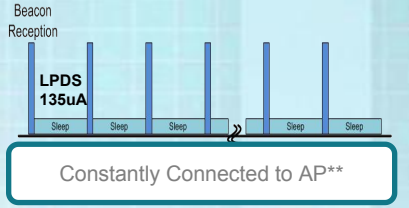
SimpleLink™ Wi-Fi® low-power mode

* Estimated (actual life time depends on customer system configurations)

Customized Power Modes for Every Use Case

Use Cases	Low Power Profiles	Lifetime* Batteries with 2AA	Low Power Features
Building Automation **Wireless Audio**	**Always Connected**	**1 year**	• **135uA Low Power Deep Sleep (LPDS) mode** while maintaining connection • Proprietary real time Network Learning optimization algorithm
Security Systems **Smart Energy** **Industrial Control**	**Intermittently Connected**	**Up to 3 years**	• **4.5uA Hibernate mode** • Fast secure TLS\SSL connection establishment in <200msec, • DCHP renew feature and more
Asset Tracking	**Transceiver**	**Up to 5 years**	• **4.5uA - Hibernate mode** • Fast sequence of wake up, transmit re-hibernate

Switch between modes in real time



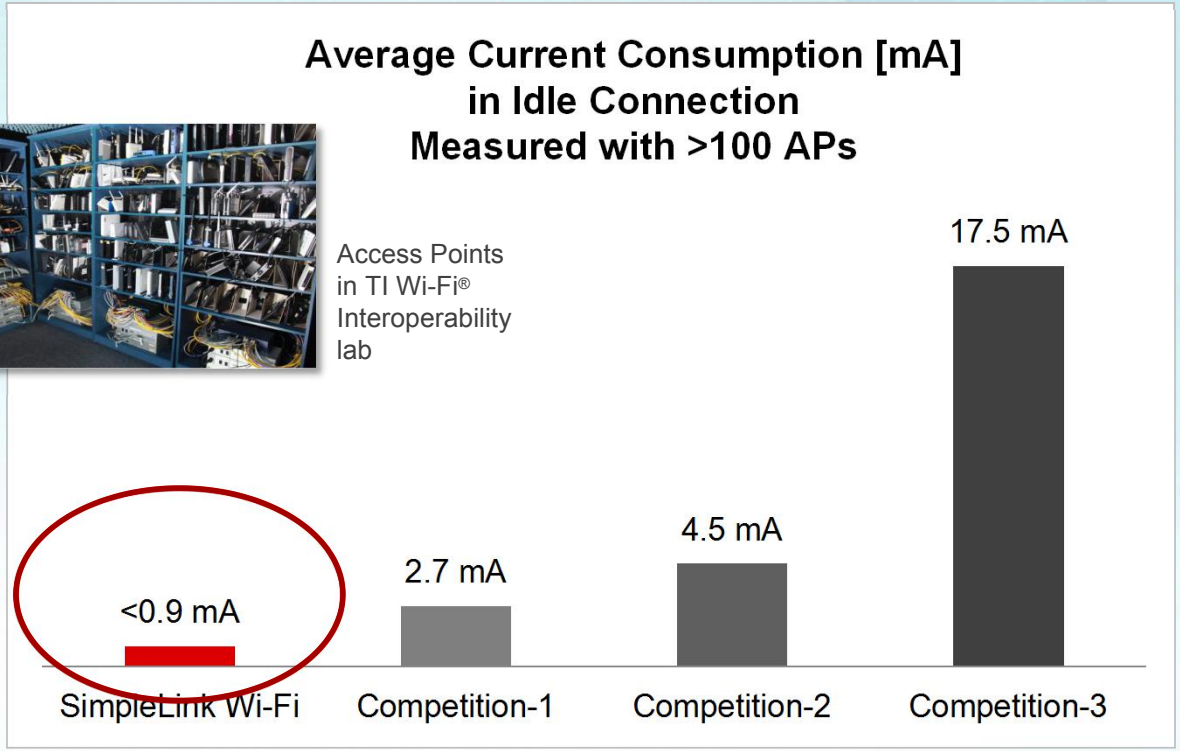
* Estimated, actual life time depends on customer system configurations
** Using TI's proprietary "Long sleep interval" configuration

Real Time Power Optimization for Real Life Low Power

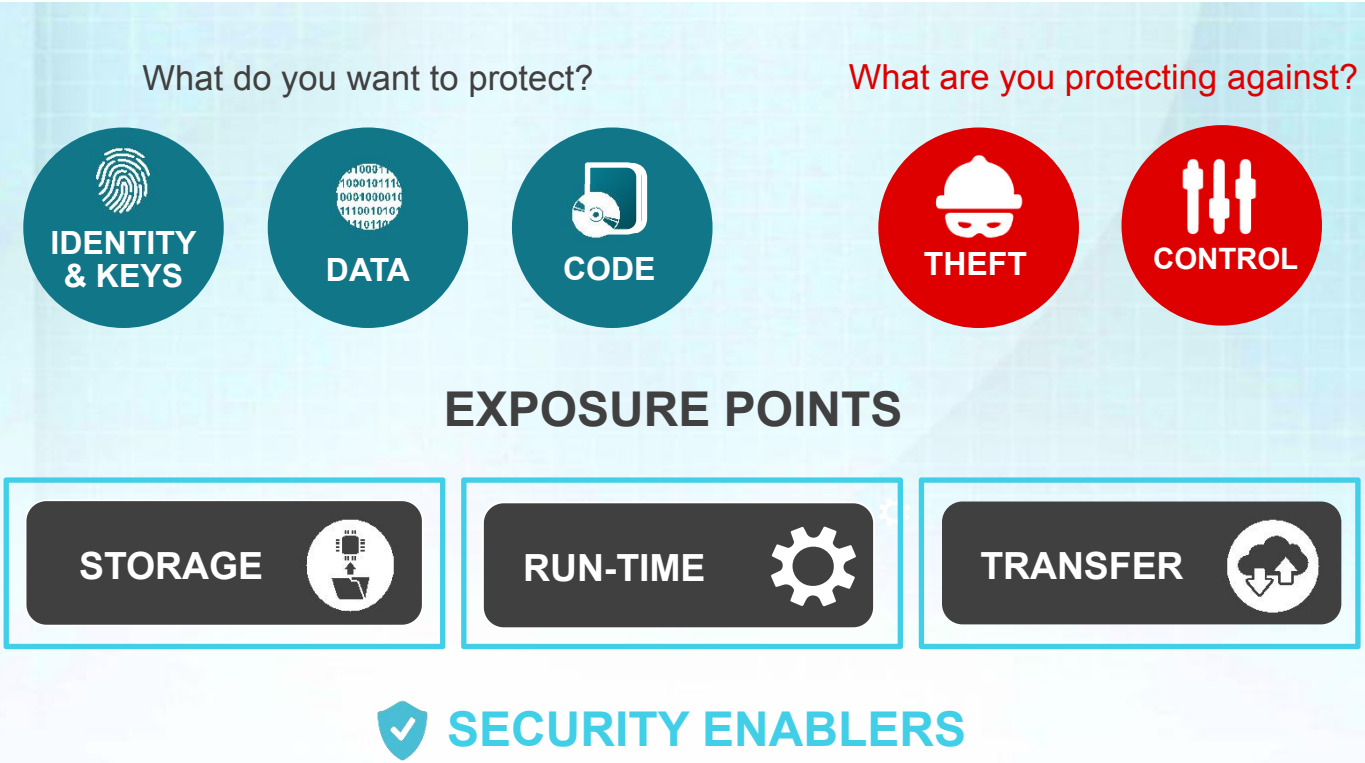
TIs Proprietary Network Learning Algorithm

- The power consumption of a Wi-Fi® node is affected by the behavior of the Access Point (AP) it connects to
- TI's SimpleLink™ Wi-Fi proprietary **Network Learning Algorithm** adapts dynamically to optimize power consumption in real time

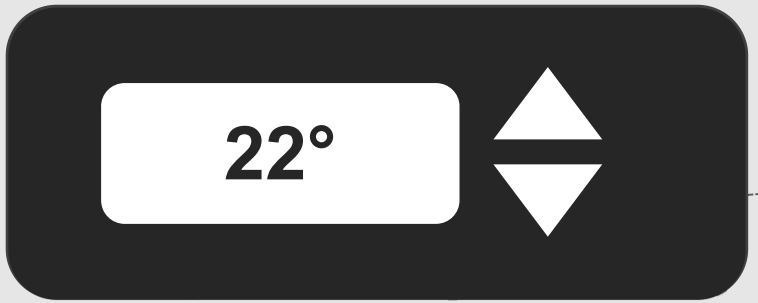
Access Points in TI Wi-Fi® Interoperability lab



Security is a top concern



SimpleLink™ Wi-Fi® – Multi Layered Security Features



Access Point

Application Servers

Vendor

User

Physical Access

Local Network Access

Remote Access

STORAGE

RUN-TIME

TRANSFER

Physical Access Security Features
- Hardware crypto engines
- Trusted root-certificate catalog
- Debug security
- Secure content delivery
- TI root of trust public key
- Secure boot
- Initial secure programming

File System Security Features
- Unique key – cloning protection
- Software tamper detection
- File encryption
- File authentication

Local Network Security Features
- Hardware crypto engines
- Trusted root-certificate cat
- Secure sockets (TLS/SSL)
- Device Identity
- Secure key storage
- Secure content delivery
- Personal & enterprise Wi-Fi security
- HTTPS service

Remote Access Security Features
- Hardware crypto engines
- Trusted root-certificate catalog
- Secure sockets (TLS/SSL)
- Device Identity
- Secure key storage
- Secure content delivery

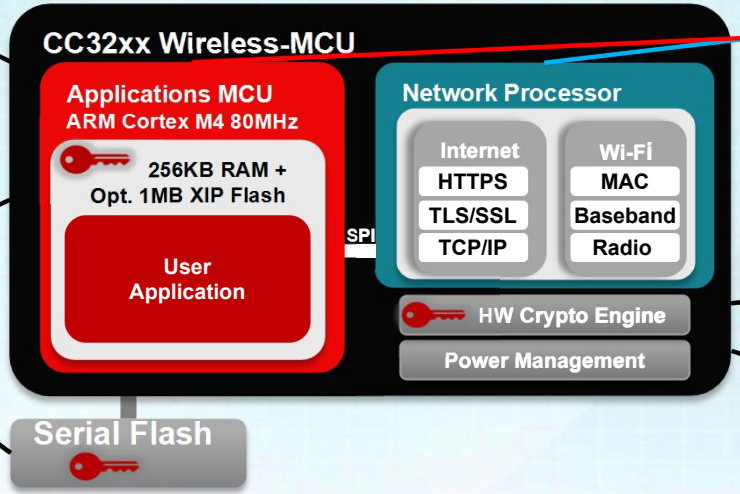
Access Distance

Unique Architecture - Wide Set of Security Features

Single chip enclosed architecture for reduced attack surface

Embedded security features reduce the need for external secure components

Encrypted File System for Customer IP/data and end user's data security



2 Separate execution environments: MCU + NWP for enhanced assets isolation and easy application integration

HW crypto engines offload the MCU and enable fast TLS\SSL secure connection establishment within 200msec

Cryptographic utilities simplify sign & verify operations to validate the authenticity of any new image

*Supported only on C3220S and CC3220SF

Software

- File system security*: Encryption, Access control, Authentication, Bundle protection, Software tamper detection*, Cloning protection
- Initial secure programming*
- Secure Boot*

Embedded HW

- Hardware Crypto Engine for advanced fast security, including: AES, DES, SHA/MD5, and CRC.
- Device-Unique Key
- Debug Security*: JTAG and Debug Ports can be Locked

Networking

- **Personal and enterprise security:** WPA/WPA2 PSK, WPA2 Enterprise
- **16** Sockets, **6** (SSLv3/TLS1.2)
- Embedded HTTPS Server
- Unique Device Identity
- Trusted Root-Certificate Catalog
- TI Root-of-Trust Public key

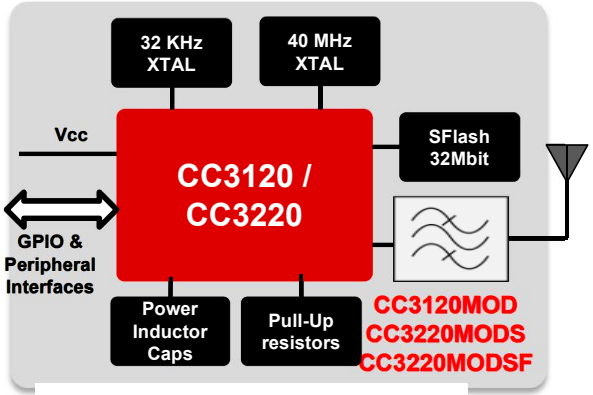
CC3x20MOD - HW overview

WiFi Performance

- Wi-Fi Transmit Power: 17 dBm @ 11b/1DSSS
- Wi-Fi Receive Sensitivity: -94.7 dBm @ 11b/1DSSS
- Transmit current: 229 mA @ 11n (54 OFDM)
- Receive current: 59 mA @ 11n (54 OFDM)
- Idle connected (DTIM=1) current : 715 µA
- Sleep current: Hibernate (6uA), LPDS (135 µa -CC3220x)

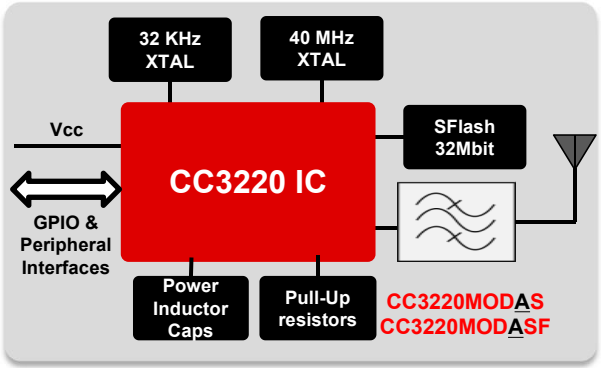
Features

- Includes on module clocks, 32Mbit SPI Flash and passives
- Land Grid Array footprint with 1.27mm pitch for low cost PCB design:
  - 17.5x20.5 mm (non-Ant),
  - 20.25 x 25.25 mm (with ant)
- FCC, IC, CE,TELEC & China Certifications to save customer effort, time and money
- Wi-Fi Alliance Wi-Fi CERTIFICATION
- CC3120MOD and CC3220MODx are pin to pin compatible



Modules without Antenna

Wi Fi CERTIFIED



Modules with Antenna

The TI IoT Cloud Ecosystem

Visit TI's Overview for the Internet of Thing

TI Supported Plugins

HomeKit

amazon web services™

Microsoft Azure

3rd Party Enabled

IBM Watson IoT™

arrayent

Temboo

EXOSITE

bug labs

xively

Kaa IOT

SimpleLink™ Wi-Fi® Family Portfolio

Low Power, Integrated Security, Ease of Use

Gen 2 Enhancements

Larger memory: 1MB Flash + 256KB RAM

Embedded IP and File System Security

>30% Longer battery life

IPv6 and HomeKit Applications

	Device	Wi-Fi Network Processor	Wireless MCU (SoC) Integrated ARM Cortex M4	Application Memory	Internet Protocols supported	# Secure Sockets (TLS/SSL)	# STA supported, in AP Mode	Networking Security	Application Security	SimpleLink MCU Platform	Availability			IC price (1kU)	EVMs
											IC	MOD No Ant	MOD + Ant		
Gen 2	CC3220SF	•	•	256KB RAM + **1MB Flash**	IPv6 + IPv4	6	4	•	•	•				$6.59	CC3220SF-LaunchXl
Gen 2	CC3220S	•	•	256KB RAM	IPv6 + IPv4	6	4	•	•	•				$5.59	CC3220S-LaunchXl LaunchCC3220MODASF
Gen 2	CC3220R	•	•	256KB RAM	IPv6 + IPv4	6	4	•		•				$4.99	
Gen 2	CC3120R	•			IPv6 + IPv4	6	4	•		•				$3.79	CC3120BOOST BoostXL-CC3120MOD

• Enhanced Networking Security

How to Choose Your SimpleLink™ Wi-Fi Device

Legend

Previous state

Question

Choice If Yes

Choice if no

Note

All SimpleLink™ Wi-Fi® have these features

- Wi-Fi Security (WEP, WPA, WPA2 Personal & Enterprise)
- Internet security (TLS, SSL)
- Can run for several months on batteries
- Hardware Crypto Engines

The SimpleLink™ Wi-Fi® CC32xx and CC31xx family of devices offers a variety of Wireless Microcontroller, and Wi-Fi network processor that enable the easy addition of Wi-Fi into any application.

Use this selection guide to choose the right device for your application

Does your system have the following requirements: Wi-Fi, Microcontroller, that is low power, has integrated Wi-Fi, internet and application level security features?

→ SimpleLink™ Wi-Fi® CC3xxx

Do you want a fully integrated system on a chip solution that combines an MCU and Wi-Fi ?

→ Wireless MCU ARM Cortex M4+ Wi-Fi Network processor CC32xx

→ Wi-Fi Network Processor CC31xx

Do you want enhanced networking security, or optimized low power, or 16 Sockets (6 secured), or support of 4 stations, IPv6?

→ Gen 2 CC3220x

→ Gen 1 CC3200

→ Gen 2 CC3120

→ Gen 1 CC3100

Do you require application level security?

or

Do you require HomeKit support?

→ Application level security features CC3220S or CC3220SF

→ Wi-Fi and Internet security features CC3220R

Is your application code more than 256kB

→ 1MB Flash + 256KB RAM CC3220SF

→ 256KB RAM CC3220S

End-to-end Development – Available Resources

www.ti.com/simplelink

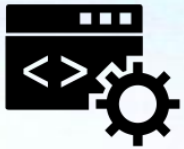
www.ti.com/simplelinkwifi

Wired & wireless ARM®-based MCUs

Common software

Development Kits

TI Resource Explorer



Code Composer Studio™ IDE

SimpleLink Academy

Thank you