

Welcome!

Texas Instruments New Product Update

- This webinar will be recorded and available at www.ti.com/npu
- Phone lines will be muted
- Please post questions in the chat or contact your sales person or field applications engineer

New Product Update: SimpleLink™ CC13xx/CC26xx wireless MCUs

Andrew Herrera

June 2021

Agenda

- Overview of TI connectivity products
- New SimpleLink™ CC26xx/CC13xx wireless MCUs
- Design challenges & TI hero solution
 - Building automation
 - Smart grid
 - Medical
- Highlights TI software offering
- Resources

Find all Connectivity products @ [TI.com/wireless](https://www.ti.com/wireless)

TEXAS INSTRUMENTS Search Login / Register English United States USD

Products Applications Design resources Quality & reliability Support & training About TI

Home / Wireless connectivity

Wireless connectivity

Product tree

- Bluetooth products (20)
- Multi-protocol products (7)
- Other wireless technologies (48)
- Sub-1 GHz products (32)
- Thread products (5)
- Wi-Fi products (28)
- Wi-SUN products (4)
- Zigbee products (8)

Overview Products Applications Support & training

Wireless connectivity products

Innovative, affordable wireless solutions for an ever-evolving connected world

Choosing the right wireless technology is critical, and we are here to help. With more than 20 years of experience, we are improving connectivity protocols including Wi-Fi®, Bluetooth®, Sub-1 GHz, Zigbee® and more. We offer a portfolio of affordable, quality and low-power wireless microcontrollers (MCUs), certified modules and transceivers along with complete software offerings to fit any RF design need. [Pick your protocol](#) to get started on your next IoT connected project.

Bluetooth®

Use Bluetooth, a low-power wireless standard, to easily connect any product to smartphones or tablets.

[Learn more](#)

Wi-Fi®

Create reliable Wi-Fi-connected products with security features, Bluetooth coexistence, dual-band, low power options and more for your MCU or processor-based system.

[Learn more](#)

Sub-1 GHz

Connect long-range, low-power devices using software solutions from simple star to wide area networks with Wireless M-BUS, MIOTY, 6LoWPAN, IEEE 802.15.4g and proprietary protocols.

[Learn more](#)

Overview of TI connectivity solutions

System solutions for performance and cost

Scalable solutions for all industrial applications



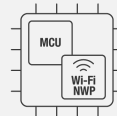
Transceivers

- RX and TX for best RF performance
- Protocol software on external MCU or MPU
- Best link budget: 143dBm



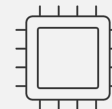
Network processors

- RF, network and IoT software in one device
- Certified protocol stacks
- Application on external MCU or MPU



Wireless MCU

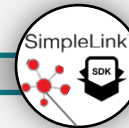
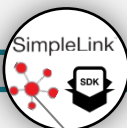
- SoC for wireless and application
- Complete solution in one device
- Applications MCU: ARM M3 or M4F. M0 and M33 in development
- Up to 1MB Flash and 256kB RAM



Certified modules

- With or without antenna
- From TI or third party vendor
- Least development effort
- No RF expertise needed

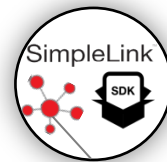
Pin to pin



Scalable software

Leading wireless innovation for 20 years

Scalable solutions for all applications



Sub-1GHz

- Best range, up to 20km
- 15 years battery life
- Star or mesh network
- Grid, BA, and more

First TRX in market
First integrated IC in market

Bluetooth®

- Best in class Bluetooth LE
- Lowest power
- Star or Bluetooth mesh
- Locationing

First BLE chip in the market
First XTAL free chip

c5a connectivity standards alliance

zigbee

- Robust low power mesh for smart home and buildings
- Zigbee 3.0 support
- Zigbee over SubGHz

ZB board from the beginning
Driving ZB over Sub1GHz

Wi-Fi® CERTIFIED

- Best IoT Wi-Fi solution
- Most robust in the market
- Best in class security

First Wi-Fi IoT chip in the market
First IC vendor with modules

amazon sidewalk

- Secure IP access from crowd sourced network
- No need to build gateways
- Get started kit available

Leading IC vendor



- Long range mesh for large networks
- Frequency hopping interference tolerance

TI owned SW stack

THREAD

- IPv6 base mesh protocol for home and building automation
- Flexible network

Early solutions

Multi-protocol

- Best in class multi-band solutions (DMM)

SW defined radio enable the space

c5a connectivity standards alliance








- Connected Home over IP
- Smart Home seamless connection with different ecosystems
- Builds on top of IP protocols

Early solutions

Proprietary and other

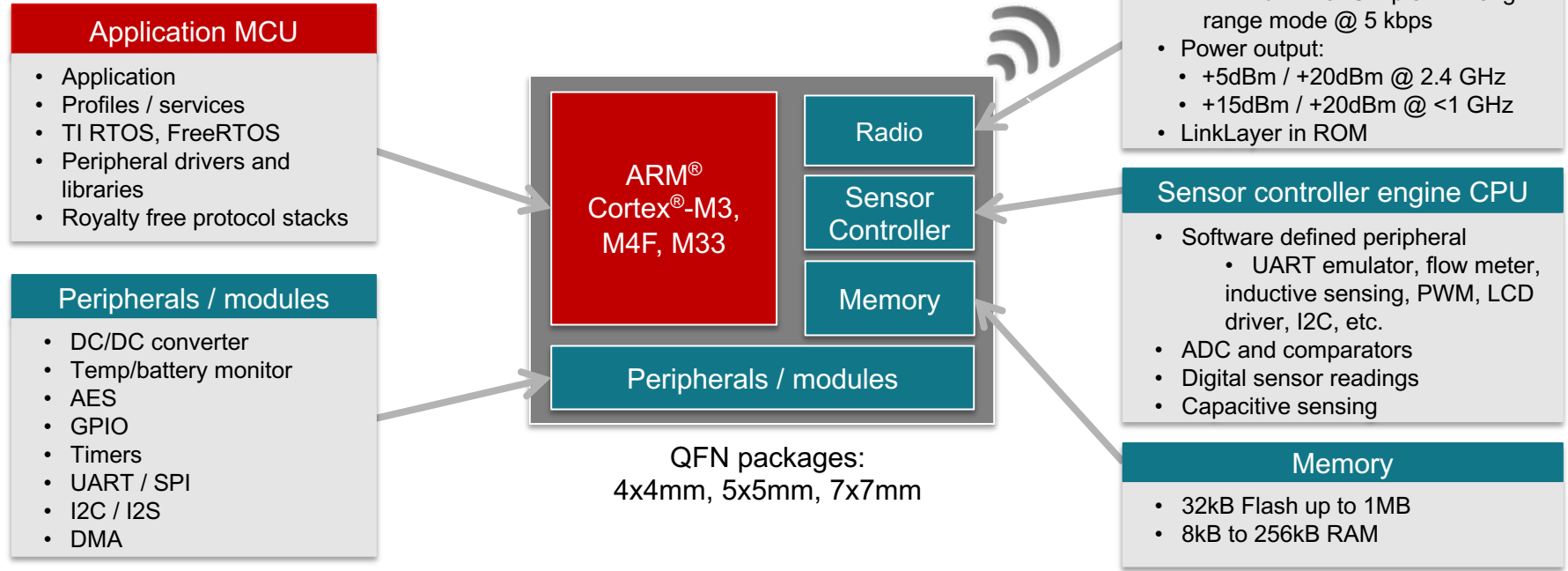
- Use our TI MAC15.4 stack or build your own protocol from scratch
- MIOTY, 6LoPAN, wMBUS and more
- Automotive solutions

Leading wireless innovation for 20 years

Building Automation	Grid Infrastructure	Medical	Automotive	Personal Electronics
<p>End Equipment's</p> <p>Sensors Building security systems HVAC systems Fire Safety System</p>  <p>BSS E-Lock HVAC Sensors</p>	<p>End Equipment's</p> <p>Smart Meter Solar energy</p>  <p>Smart meter Optical Reader Replacement Solar panel battery / inverter</p>	<p>End Equipment's</p> <p>Patient Monitoring & Diagnostics Medical Equipment Home Healthcare</p>  <p>Medical equipment Home health Patient monitoring</p>	<p>End Equipment's</p> <p>Car Access Telematics TPMS Wireless BMS</p>  <p>Car Access Telematics TPMS Wireless BMS</p>	<p>End Equipment's</p> <p>Remote Control Gaming (Console, peripherals) Wireless Microphones Toys</p>  <p>Remote Control Gaming Peripherals Wireless Microphone Gaming Headsets Toys</p>
<p>Scalable solutions for Smart Buildings</p> <p>Robust, reliable connectivity that support easy development, long-range, large deployment and remote monitoring for battery or line powered application</p>	<p>Effective connectivity of energy data</p> <p>Monitor home and cities grid systems wirelessly; with reliable, affordable solutions designed outdoor environments</p>	<p>Reliable and Certified connectivity</p> <p>High quality, reliable, RF modules and SoCs that meets federal security standards, from a stable supplier. – because life matters.</p>	<p>Auto Quality System Solution</p> <p>High quality Auto or functional safety qualified products that meets OEM auto quality with reliable, robust system solution and optimized system cost</p>	<p>Fast, Efficient Communication</p> <p>Design battery powered, high data-rate SoCs or modules for fast and reliable data transfer at affordable cost</p>

New SimpleLink™ CC26xx/CC13xx wireless MCUs

Highly flexible radio architecture

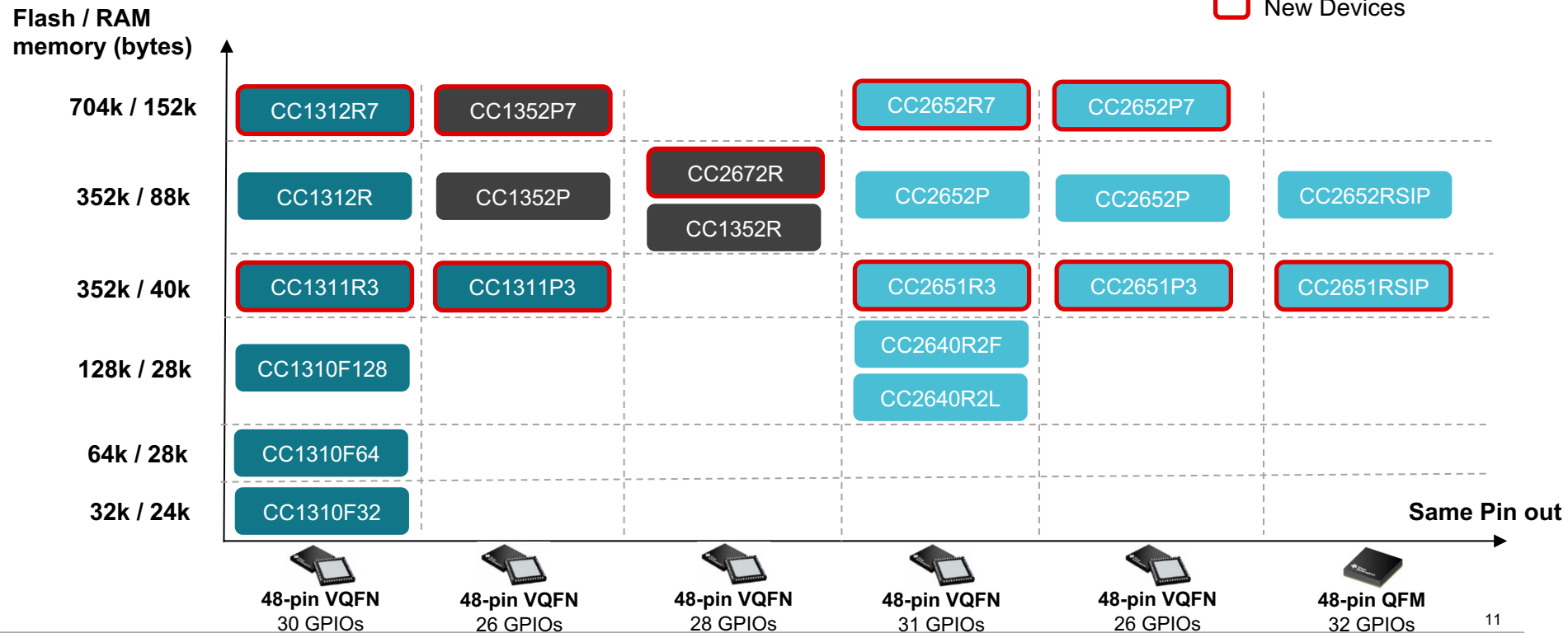


Most scalable Connectivity portfolio

Pin & API compatible

Legend:

- Sub-1 GHz
- Sub-1 + 2.4 GHz Dual Band
- 2.4 GHz
- New Devices



Multiprotocol | CC2652x7

RF Features

- 2.4GHz wireless MCU supporting various industry wireless standards
- Bluetooth Low Energy 5.2 features
 - 2M PHY, LR, Direction Finding,
 - Bluetooth mesh (low power node)
- Zigbee 3.0, BLE Mesh 1.0, 15.4 & Proprietary
- Integrated PA optimized for +10dBm and +20dBm
- RX sensitivity: -97dBm @1Mbps, -103dBm @125kbps

Ultra-low Power Consumption (VDD = 3.0V)

- Standby current < 1.15uA (RTC, RAM retention)
- Radio currents Rx - 6.9mA, Tx @0dBm - 7.3mA, @+10 dBm - 22mA, @ +20 dBm < 85mA

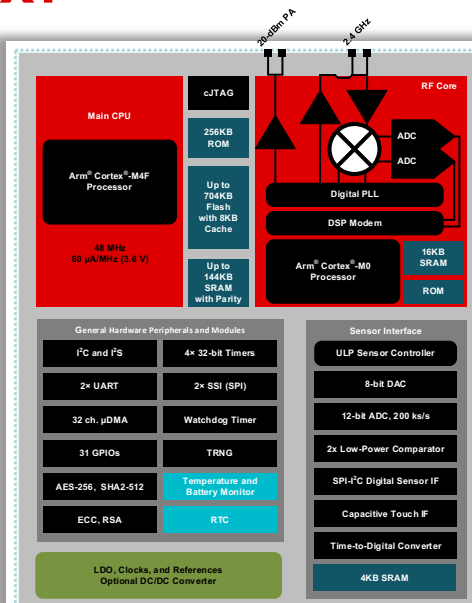
Supply & Temperature

1.71V – 3.6 V supply range
-40C to 105C Temperature

Package Options

- 7x7 QFN48

Scalability: PCB pin to pin compatible devices with scalable memory (flash, RAM), OAD options, #IOs, and IP integration.



Multiprotocol applications with on-chip over-the-air update capability

CC2652x7	CC2652x	Key Applications
704KB Flash	352KB Flash	
152KB SRAM + Cache	88KB SRAM + Cache	

- Building Automation:** wireless sensors, Lighting control, ..
- Personal Electronics:** toys, HID stylus pens, ..
- Medical:** toothbrushes shavers, patient monitoring, IR thermometers...
- Asset tracking:** beacons tags, industrial transportation
- Retail:** EPOS, ESL
- Grid:** cable replacement

Resources / Getting started

- Platform SW scalability with easy migration across device families. Start developing now with CC2652x devices
- Start SW development with CC13x2 and CC26x2 SDK
- Faster development time with easy to use stack APIs, multiple sample examples, demos, and TI resource explorer (TIRex) documentation
- Visit www.ti.com/ble for all Bluetooth LE resources

Why CC2652x7?

Connectivity	<ul style="list-style-type: none"> Ideal for connected gateway products supporting Matter (formerly known as CHIP)
On-chip OAD	<ul style="list-style-type: none"> 704kB flash memory enables end-device apps with on-chip dual image OAD and secure firmware updates.
Scalable stack support	<ul style="list-style-type: none"> Programmable radio enables support for latest Bluetooth LE and Zigbee features (e.g. direction finding)
Ease of migration	<ul style="list-style-type: none"> Scalability: API compatible with SimpleLink CC13x2 and CC26x2 SDK Simplified certification: Inherit TI's existing Bluetooth (BLE5-Stack) qualification

Single Protocol | CC2651x3

RF Features

- 2.4GHz wireless MCU supporting various industry wireless standards
- Bluetooth Low Energy 5.2 features
 - 2M PHY, LR, Direction Finding,
 - Bluetooth mesh (low power node)
- Zigbee 3.0, BLE Mesh 1.0, 15.4 & Proprietary
- Integrated PA optimized for +10dBm and +20dBm
- RX sensitivity: -97dBm @1Mbps, -103dBm @125kbps

Ultra-low Power Consumption (VDD5 = 3.0V)

- Standby current < 0.92uA (RTC, RAM retention)
- Radio currents Rx - 6.8mA, Tx @0dBm - 7.1mA, @+10 dbm - 22mA, @ +20 dBm < 85mA

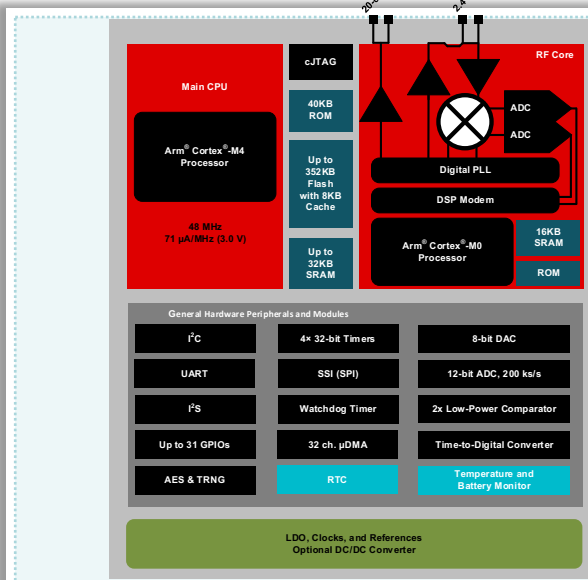
Supply & Temperature

1.71V – 3.6 V supply range
-40C to 105C Temperature

Package Options

- 5x5 QFN40, 7x7 QFN48

Scalability: PCB pin to pin compatible devices with scalable memory (flash, RAM), OAD options, #IOs, and IP integration.



Single-protocol end-device applications with over-the-air upgrade capability

Key Applications

- Building Automation:** wireless sensors, Lighting control, ..
- Personal Electronics:** toys, HID stylus pens, ..
- Medical:** toothbrushes shavers, patient monitoring, IR thermometers,...
- Asset tracking:** beacons tags, industrial transportation
- Retail:** EPOS, ESL
- Grid:** cable replacement

Resources / Getting started

- Platform SW scalability with easy migration across device families. Start developing now with CC2652x devices
- Start SW development with CC13x2 and CC26x2 SDK
- Faster development time with easy to use stack APIs, multiple sample examples, demos, and TI resource explorer (TIRex) documentation
- Visit www.ti.com/ble for all Bluetooth LE resources

Why CC2651x3?

Extended battery life	<ul style="list-style-type: none"> Ultra-low standby current extends battery life significantly for applications with long sleep intervals (>5s)
On-chip OAD	<ul style="list-style-type: none"> 352kB flash memory enables end-device apps with on-chip multi-step OAD and secure firmware updates.
Scalable stack support	<ul style="list-style-type: none"> Programmable radio enables support for latest Bluetooth LE and Zigbee features
Ease of migration	<ul style="list-style-type: none"> Scalability: API compatible with SimpleLink CC13x2 and CC26x2 SDK Simplified certification: Inherit TI's existing Bluetooth (BLE5-Stack) qualification

CC2651x3	CC2652x
Cortex-M4	Cortex-M4F
40kB SRAM + Cache	88kB SRAM + Cache
Drivers	RTOS and Wireless stacks partially in ROM
No Sensor Controller	Integrated Sensor Controller
AES128 and TRNG	AES-256 and SHA2 integrated
1x UART 1x SPI	2x UART 2x SPI

Multi-band & higher memory | CC1352P7 & CC1312R7

RF Features

- Sub-1 GHz wireless MCU supporting various industry wireless standards
- Excellent RF performance: up to 130dBm link budget @ 50kbps, 868 MHz
- Narrowband long range: up to 141dBm link budget @ 2.5kbps, 868 MHz
- Bluetooth 5 LE coded PHY with -105dBm sensitivity
- Integrated PA optimized for +10dBm and +20dBm

Ultra-low Power Consumption

- Standby current 0.95 μ A (RTC, RAM retention)
- Radio currents Rx 5.8mA (868MHz), Tx @14dBm 24.9mA

Supply & Temperature

1.71V – 3.6 V supply range
-40C to 105C Temperature

Package Options

- 7x7 QFN48

Scalability: PCB pin to pin compatible devices with scalable memory (flash, RAM), OAD options, #IOs, and IP integration.



Multiprotocol applications with on-chip over-the-air update capability

CC1352P7	CC1352P	Key Applications
704KB Flash	352KB Flash	
152KB SRAM + Cache	88KB SRAM + Cache	

- **Grid Infrastructure**
E-meters, Flow meters
- **Smart City**
Street lighting, Asset Tracking
- **Building Automation:**
Gateways, wireless sensors etc

Resources / Getting started

- Platform SW scalability with easy migration across device families. Start developing now with CC13x2R/P devices
- Start SW development with CC13x2 and CC26x2 SDK
- Faster development time with easy to use stack APIs, multiple sample examples, demos, and TI resource explorer (TIRex) documentation
- Visit www.ti.com/sub1ghz for resources

Why CC1352P7 / CC1312R7?

Connectivity	• Ideal for Wi-SUN or Amazon Sidewalk applications
On-chip OAD	• 704KB flash memory enables end-device apps with on-chip dual image OAD and secure firmware updates.
Multi-protocol	• More room for multi-protocol applications (concurrent operation of 2 SW stacks)
Ease of migration	• Scalability: API compatible with SimpleLink CC13x2 and CC26x2 SDK • Simplified certification: Inherit TI's existing Bluetooth (BLE5-Stack) qualification

Optimized Sub-1GHz | CC1311R3 & CC1311P3

RF Features

- Sub-1GHz wireless MCU supporting various industry wireless standards
- Excellent RF performance: up to 130dBm link budget @ 50kbps, 868 MHz
- Narrowband long range: up to 141dBm link budget @ 2.5kbps, 868 MHz
- +20 dBm power amplifier with industry lowest power consumption with CC1311P3

Ultra-low Power Consumption

- RX: 5.8 mA (868 MHz)
- TX at +14 dBm: 24.9 mA (868 MHz)
- Standby: 0.9 μ A (RTC on, 32KB RAM and CPU retention)

Supply & Temperature

1.71V – 3.6 V supply range
-40C to 105C Temperature

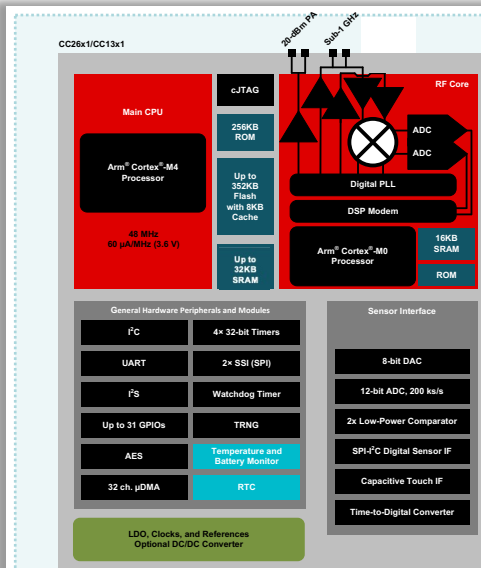
Package Options

- 5x5 QFN40, 7x7 QFN48

Scalability: PCB pin to pin compatible devices with scalable memory (flash, RAM), OAD options, #IOs, and IP integration.

Resources / Getting started

- Platform SW scalability with easy migration across device families. Start developing now with CC13x2 devices
- Start SW development with CC13x2 and CC26x2 SDK
- Faster development time with easy to use stack APIs, multiple sample examples, demos, and TI resource explorer (TIRex) documentation
- Visit www.ti.com/sub1ghz for resources



Single-protocol device with over-the-air upgrade capability

Key Applications

- **Building Automation:** Gateways, PIR sensors, Contact sensors, etc
- **Grid Infrastructure** Low-cost metering projects
- **Wireless Microphone** Small size and capable of running SimpleLink Audio Plug-in

Why CC1311x3?

Extended battery life	• Ultra-low standby current extends battery life significantly for applications with long sleep intervals (>5s)
On-chip OAD	• 352KB flash memory enables end-device apps with on-chip multi-step OAD and secure firmware updates.
Smaller size	• CC1311R in 5x5 QFN package enable 22GPIOs with 0.4mm pitch. Enough GPIOs for more applications
Ease of migration	• Scalability: API compatible with SimpleLink CC13x2 and CC26x2 SDK

CC1311R / CC1311P	CC1312R
Cortex-M4	Cortex-M4F
40KB SRAM + Cache	88KB SRAM + Cache
Drivers	RTOS and Wireless stacks partially in ROM
No Sensor Controller	Integrated Sensor Controller
AES128 and TRNG	AES-256 and SHA2 integrated
1x UART 1x SPI	2x UART 2x SPI

Design challenges & TI hero solution

Building Automation

Grid Infrastructure

Medical

Building Automation key design challenges

1

Full home coverage

- Increased intelligence with long range sensors

2

Remote monitoring

- Ability to control & detect through a smart device

3

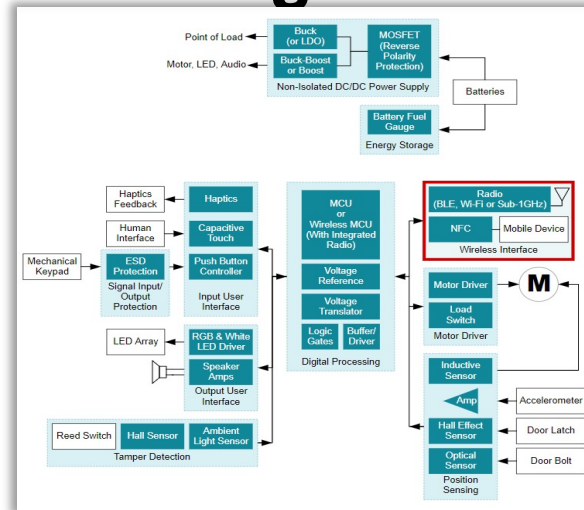
Long battery life

- Accurate & reliable sensing with maximum lifetime

4

Small form factor

- Minimize solution size for space constrained designs



Electronic smart lock reference design

New Devices	Key Technology	Memory
CC2652P7	Matter, Bluetooth Low Energy 5.2, Bluetooth Mesh, Zigbee 3.0, Thread, Proprietary 15.4	704kB Flash, 152kB SRAM
CC1352P7	Wi-SUN, Amazon Sidewalk, TI 15.4 Stack, Proprietary radio frequency (RF), ZigBee, Thread, Bluetooth Low Energy	704 kB Flash, 152kB SRAM
CC2672P3	Zigbee Sub-GHz, Bluetooth Low Energy 5.2	352 kB Flash, 88kB SRAM
CC2652RSIP	Bluetooth Low Energy 5.2, Bluetooth Mesh, Zigbee 3.0, Thread, Proprietary 15.4	352 kB Flash, 88kB SRAM

Smart Grid key design challenges

1

Eliminate manual meter reading

- Wirelessly collect usage data within noisy environments

2

Detect meter leaks or outages

- Remotely monitor grid performance

3

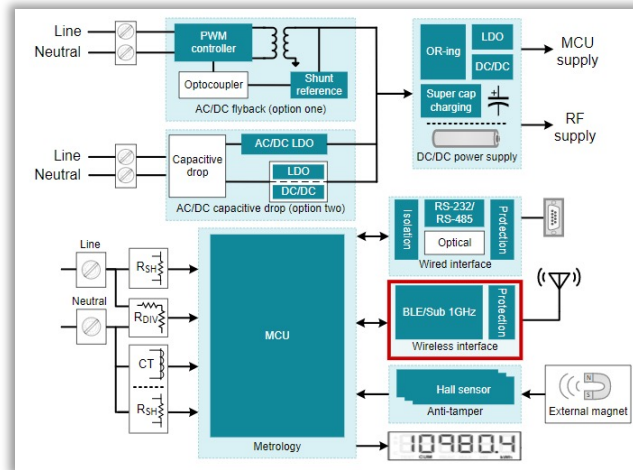
Reduce cost

- Enable more meters per gateway for extended coverage

4

Long battery life

- Reduce maintenance costs



Electricity meter reference design

New Devices	Key Technology	Memory
CC1312R7	Wi-SUN, Amazon Sidewalk, TI 15.4 Stack, Proprietary radio frequency (RF)	704 kB Flash, 152kB SRAM
CC1311P3	Mioty, TI 15.4 Stack, Proprietary RF	352 kB Flash, 40kB SRAM
CC2651P3	Bluetooth Low Energy 5.2, Bluetooth Mesh, Zigbee 3.0, Thread Proprietary 15.4	352 kB Flash, 40kB SRAM

Medical key design challenges

1

Collect data remotely

- Increased need to monitor vitals, untether the patient, & share data via the cloud

2

Small form factor

- Minimize the solution size for wearable sensors

3

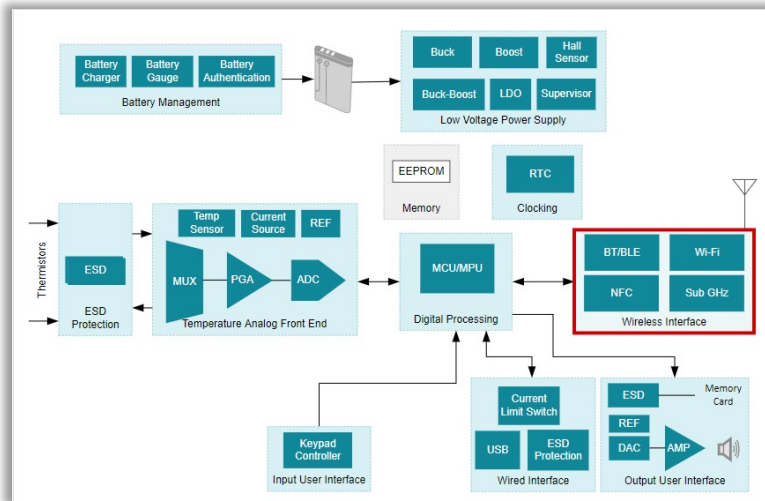
Long battery life

- Maximize wearable time & reduce battery size

4

Reliability

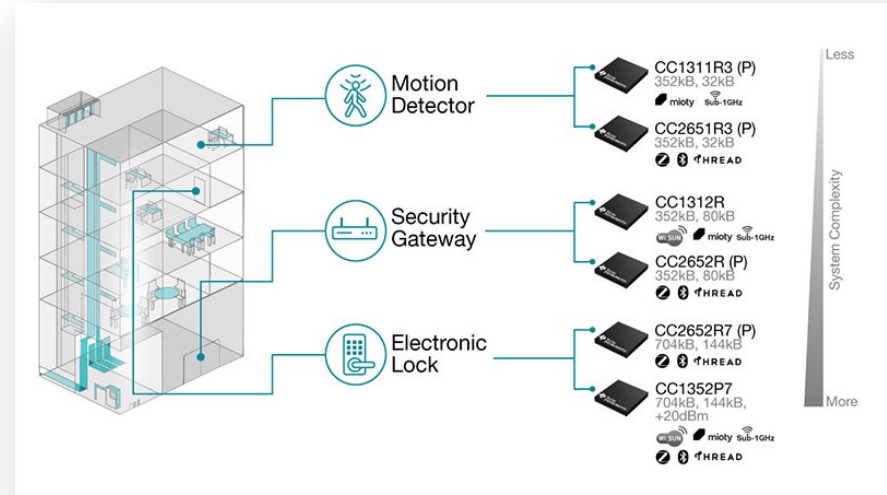
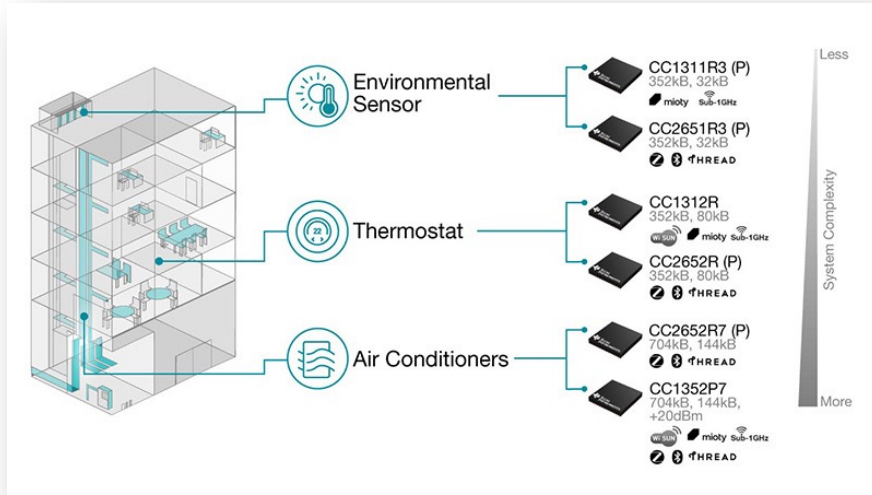
- Ensure patient critical data is protected



Temperature sensor patch reference design

New Device	Key Technology	Memory
CC2652RSIP	Bluetooth Low Energy 5.2, Bluetooth Mesh, Zigbee 3.0, Thread, Proprietary 15.4	352 kB Flash, 88kB SRAM
CC1311R3	Mioty, TI 15.4 Stack, Proprietary RF	352 kB Flash, 40kB SRAM
CC2651R3	Bluetooth Low Energy 5.2, Bluetooth Mesh, Zigbee 3.0, Thread Proprietary 15.4	352 kB Flash, 40kB SRAM

Implementing a multiprotocol system



- ✓ Most Scalable Connectivity Solution
- ✓ Pin-to-pin hardware & API compatible
- ✓ Save design time & investment costs

TI software offering

Sub-1 GHz software solutions

IEEE 802.15.4: TI 15.4 Stack

Complete standards based star network
Low-power end nodes & gateway
Many RF PHYs to choose from for world-wide regulatory compliance & application needs



Wi-SUN®

Standards-based robust mesh network, frequency hopping
Standards based multi-layer security & IPv6 protocol suite
Alliance: >230 members from 26 countries, 95M devices deployed WW



Wireless M-BUS

Only European standard for metering
Sub-1GHz star network with long range using 433MHz / 868MHz
Multiple options to suit your meter with wireless network processor or single SoC



Amazon Sidewalk

Leverages the 900 MHz band to create a long-range, low-power home network to extend the range of low-bandwidth devices beyond the home Wi-Fi network



TI's long range offering

mioty

New standards-based LPWAN solution backed by major industry players including TI
Up to 5km in urban / 15km in rural areas
Low data rate, low power network



Dual-band

Adding BLE to a Sub-1 GHz stack significantly streamlines device configuration & OTA firmware updates



Bluetooth low energy **software solutions**

Long range with Bluetooth 5

4x the range with coded PHY rates of 125kbps, enables full home coverage with same TX & RX current consumption



AoA with Bluetooth 5.1

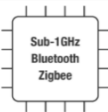
RTLS toolbox enables localization on a coin cell, certified solutions with proven interoperability & automotive quality



TI's Bluetooth LE offering

Multi-protocol

Add BLE to a Sub-1 GHz or Zigbee network concurrently for easy smartphone connection/control. Plus Wi-Fi Coex



Connection monitor

Enhances secure connections & enables lower power performance by following BLE connections to avoid packet loss



Bluetooth Mesh

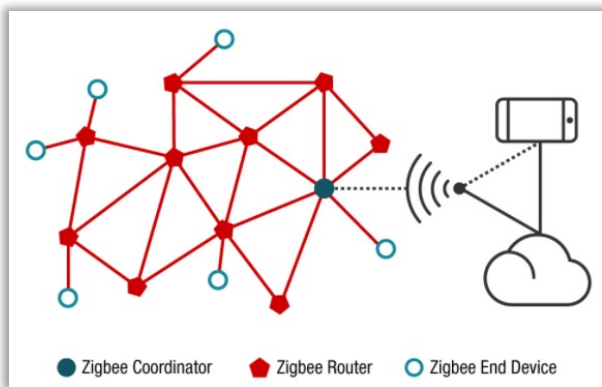
Extends range & provides direct access to smartphones. Uses Bluetooth LE multichannel operation for better coex



Connectivity Standards Alliance

Zigbee 3.0

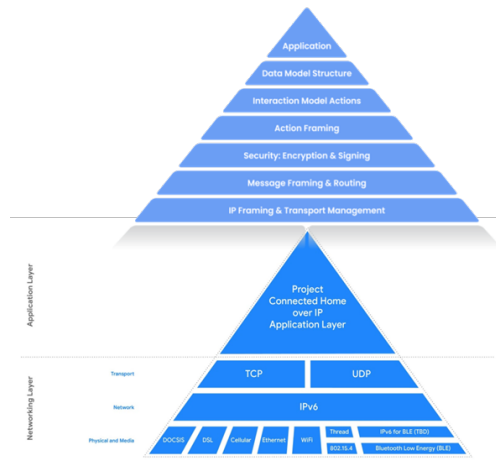
- Worldwide standard for low-power, self-healing, mesh networks targeting home & building automation
- Battery-less products supported with Green Power Devices
- Support for lowest power Zigbee end device: +10dbm on a coin cell
- Sample app examples included to easily build your application



Zigbee mesh networks

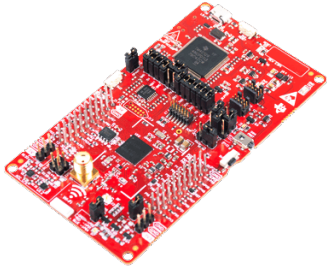
Matter (Formerly CHIP)

- 10 years in the Connectivity Standards Alliance (formerly Zigbee Alliance)
- TI is the Chair for Zigbee Sub-1 GHz & is driving Technical & Marketing Working Groups
- Matter (formerly Connected Home over IP)
- First crystal-less Zigbee SoC with BAW technology

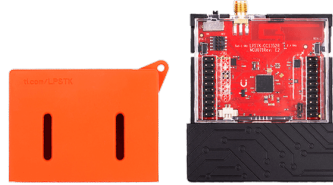


TI.com tools - www.ti.com/connectedworld

Development kits



[LaunchPad™ development kits](#)



[LaunchPad SensorTag kit](#)

Training Videos



[Videos](#)



[Podcasts](#)

Design Tools



[Resource Explorer](#)



[Code Composer Studio](#)



[SimpleLink Academy](#)



[E2E™ Forum](#)

Visit www.ti.com/npu

For more information on the New Product Update
series, calendar and archived recordings



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