

# Wireless Connectivity Solutions



Today with more users, things and cloud services connecting to the Internet, the role of wireless connectivity is becoming increasingly important.





At Texas Instruments (TI), we are committed to delivering a broad portfolio of wireless connectivity solutions which consume the lowest power and are the easiest to use. With TI innovation supporting your designs, you can share, monitor and manage data wirelessly for applications in wearables, home and building automation, manufacturing, smart cities, healthcare and automotive.

Learn how you can be a part of the Internet of Things (IoT) as TI helps you connect more.


**Lowest power. Largest selection. Easiest to use.**

## Broadest portfolio of technologies

With products and support for more than 14 technologies, standards and protocols you have the industry's broadest wireless connectivity portfolio to meet a variety of network sizes and topologies. Each solution is developed to help you add connectivity to any application through a range of **wireless microcontrollers (MCUs)**, **wireless network processors** and **smart RF transceivers**.

	Low-power offering of all technologies and system positioning			High-performance Wi-Fi® + Bluetooth® / Bluetooth low energy combo
Software system partitioning				
Application			•	
Wireless stack		•	•	
RF radio	•	•	•	•

## Technologies supported by TI's wireless connectivity solutions




Bluetooth® wireless technology is one of the most prominent short-range / mid-range communications technologies with an installed base of over three billion units. Our solutions include:

- Bluetooth Low Energy (BLE)
  - SimpleLink **CC2640R2F** wireless MCU (BLE 4.2 and BLE 5.0)
  - SimpleLink **CC2640** wireless MCU (BLE 4.2)
  - CC2650MODA** pre-certified module (BLE 4.2)
  - CC2541-Q1** / **CC2541** (I²C interface) (BLE 4.0)
  - CC2540T** (up to 125°C) (BLE 4.0)
  - CC2540** (USB interface) (BLE 4.0)

- Classic and dual-mode Bluetooth
  - CC2564C** dual-mode Bluetooth (BLE 4.2)
  - CC2560** classic Bluetooth (BT 2.0)
  - LMX9838** classic Bluetooth 2.0 plug and play module

Learn more at: [www.ti.com/ble](http://www.ti.com/ble)

[www.ti.com/bluetooth](http://www.ti.com/bluetooth)




Wi-Fi® is a key technology driving the IoT by enabling devices to connect directly to each other or to broader networks. We have a variety of options allowing customers to configure, connect and communicate across a variety of markets. Our solutions include:

- WiLink 8 Wi-Fi** + dual-mode Bluetooth (BT Classic + BLE 4.2): High-performance combo connectivity for processors
- SimpleLink Wi-Fi: CC32xx** wireless MCU and **CC31xx** wireless network processor

Learn more at: [www.ti.com/wifi](http://www.ti.com/wifi)


[Getting Started](#) with WiLink



Within the Sub-1 GHz market, our smart RF transceivers and wireless MCUs offer high performance and best-in-class range with leading ultra-low-power consumption. Our solutions include:

Ultra-Low Power:	Performance Line:	Value:	Range Extender:
• <b>CC1350</b> / <b>CC1310</b>	• <b>CC1120</b> / <b>CC1125</b> / <b>CC1200</b>	• <b>CC110L</b> / <b>CC113L</b> / <b>CC115L</b>	• <b>CC1190</b>

Learn more at: [www.ti.com/sub1ghz](http://www.ti.com/sub1ghz)




6LoWPAN is a low-power wireless mesh network where every node has its own IPv6 address, allowing it to connect directly to the Internet using open standards. These solutions deliver the lowest power, most complete solution set with dual-band support for city-wide networks. Our solutions include:

SimpleLink **CC2650** wireless MCU

• **CC2538** wireless MCU

• **CC2592**

Learn more at: [www.ti.com/6lowpan](http://www.ti.com/6lowpan)




ZigBee® is a standard for low-power mesh networks. TI offers low-power solutions with the ability to operate for multiple years with a small coin cell, the ability to connect 100s of nodes and easy-to-use kits and reference designs that allow you to start development quickly. Our solutions include:

SimpleLink **CC2630** wireless MCU

• **CC2530** wireless MCU

• **CC2538** wireless MCU

Learn more at: [www.ti.com/zigbee](http://www.ti.com/zigbee)




Multi-standard devices

• **CC1350** (Sub-1 GHz + BLE)

• **CC2650** (BLE, 6LoWPan, ZigBee, RF4CE and 2.4-GHz proprietary)

• **CC2620** (RF4CE)



Near Field Communication (NFC) enables short range bi-directional communication providing secure, low-power interaction between devices. TI provides one of the industry's largest, most differentiated NFC product portfolios enabling lower power solutions to meet a broad range of RF connectivity needs. Our solutions include:

• **RF430FRL15xH** sensor tags

• **TRF7970A** transceivers

• **RF430CL330H** dynamic tags

• **TRF796xA** reader/writer transceivers

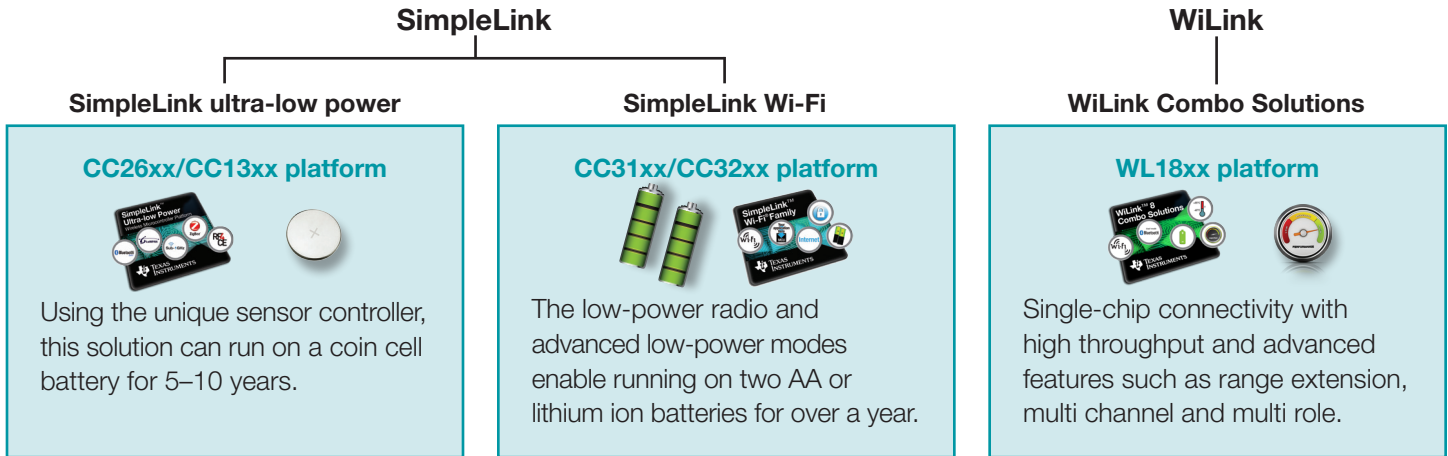
• Tag-it™ HF-I static tags

Learn more at: [www.ti.com/nfc](http://www.ti.com/nfc)

## Low-power wireless connectivity

When we introduced the **SimpleLink™ ultra-low power wireless MCU platform**, TI set a new industry power consumption benchmark for **Bluetooth® Low Energy (BLE)**, **Sub-1 GHz**, **ZigBee®**, **6LoWPAN** and **ZigBee RF4CE™** wireless MCUs. The **SimpleLink Wi-Fi® Internet-on-a-chip™ platform** also delivers a **low-power wireless MCU** for battery-operated products and systems.

Additionally, TI offers SimpleLink wireless network processors and smart RF transceivers as well as combo connectivity solutions through the **WiLink™** platform, allowing customers to add low-power connectivity to wearables, portable electronics, home/building automation applications, industrial and embedded automotive designs. For more information about TI's low-power wireless connectivity offerings visit: [www.ti.com/simplelink](http://www.ti.com/simplelink)



## TI certified wireless modules

Wireless technology	TI chip supported	TI certified module offering	3rd-party module
BLE 4.2	SimpleLink Wireless MCU <b>CC2650, CC2640</b>	<b>CC2650MODA</b> : TI SimpleLink Bluetooth Low Energy module with integrated antenna (BLE 4.2) <i>(CC2640R2F BT 5.0 modules coming end of 1H16 from third party)</i>	✓
Dual-mode Bluetooth (Classic + BLE 4.1)	SmartRF Transceiver <b>CC2564</b>	<b>CC2564MODN</b> : TI Dual-Mode Bluetooth module with external antenna <b>CC2564MODA</b> : TI Dual-Mode Bluetooth module with integrated antenna	✓
Low-power Wi-Fi	SimpleLink Wi-Fi Network Processor: <b>CC3100</b> SimpleLink Wi-Fi Wireless MCU: <b>CC3200</b>	<b>CC3100MOD</b> : Add Wi-Fi module to any microcontroller <b>CC3200MOD</b> : Single-chip Wi-Fi + integrated microcontroller	✓
High-performance Wi-Fi Combo Wi-Fi + Bluetooth Classic + 4.2 BLE	WiLink Combo Solution (Wi-Fi + BT / BLE) <b>WL18xx</b>	<b>WL1801MOD</b> : Wi-Fi, Single antenna <b>WL1805MOD</b> : Wi-Fi, Dual antenna (MIMO/MRC) <b>WL1807MOD</b> : Wi-Fi, Dual antenna (MIMO/MRC) + Dual-band (2.4 GHz + 5 GHz) <b>WL1831MOD</b> : Wi-Fi + BT + BLE, Single antenna <b>WL1835MOD</b> : Wi-Fi + BT + BLE, Dual antenna (MIMO/MRC) <b>WL1837MOD</b> : Wi-Fi + BT + BLE, Dual antenna (MIMO/MRC) + Dual-band (2.4 GHz + 5 GHz)	✓
Long range Sub-1 GHz	SmartRF Transceivers CC11xx, CC12xx SimpleLink Wireless MCU <b>CC1310, CC1350</b>	Third party only  TI roadmap plan + third party availability	✓
6LoWPAN ZigBee 2.4 GHz Proprietary	CC253x Wireless MCU SimpleLink Wireless MCU <b>CC2630, CC2650</b>	Third party only  <b>CC2650MODA</b> : TI SimpleLink 2.4 GHz multi-standard module	✓

### Power Management Resources

- **SimpleLink Wi-Fi CC3100/CC3200 Internet-on-a-chip Sub-system Power Management**
- **Taking power to a new low with the SimpleLink ULP wireless MCU platform**
- **SimpleLink Wi-Fi CC3100/CC3200 WLAN RF Transmit Power Peak and Average Measurements**
- **BLE Power Calculator**

## Easy-to-use:




Embedded development made easy due to **TI certified wireless modules**, low-cost tools, development kits, software platforms and technical documentation. Leverage information through the variety of **TI Designs**, online **TI Training**, **ConnectIng Wirelessly** and **TI E2E™ Community** support for accelerated ramp to market.



## Easy-to-use: Software, support and more

Software	<p><b>Common software</b></p> <p>Across all SimpleLink™ products</p> <ul style="list-style-type: none"><li>• TI-RTOS operating system</li><li>• Code Composer Studio™ Integrated Development Environment</li><li>• IAR Embedded Workbench for ARM®</li></ul>	<p><b>Royalty-free network stacks</b></p> <p>Robust, certified and proven stacks</p> <ul style="list-style-type: none"><li>• <i>Bluetooth®</i> and BLE-Stack with OTA support</li><li>• Z-Stack™ supporting various ZigBee® applications</li><li>• Sub-1 GHz TI 15.4 software development kit</li></ul>	
Support	<p><b>Comprehensive</b></p> <p>Development documentation, guides and wikis available online</p>	<p><b>E2E support</b></p> <p><b>Online community</b> answers at your fingertips from engineers</p>	<p><b>Training</b></p> <p>Online videos and other resources to learn more about the parts and tools See <b>TI Training</b></p>
Modules	<p><b>Industry-leading performance</b></p> <p>High-quality module choice for many wireless technologies</p>	<p><b>Faster development time</b></p> <p>Get to market faster with TI's worldwide ecosystem</p>	<p><b>Proven and dependable supplier</b></p> <p>Protect your production and your investment</p>
And more ...	<p><b>TI Designs</b></p> <p>TI reference designs online</p>	<p><b>TI IoT cloud ecosystem</b></p>	<p><b>TI store</b></p> <p>Silicon &amp; kit sales &amp; samples on TI Store</p>

## TI Designs for the IoT

Sensor to Cloud reference design	UART-to-Bluetooth® low energy (BLE) bridge reference design	SimpleLink CC3200-OV788 Video/Audio streaming over Wi-Fi reference design
 Shows how to connect sensors to the cloud over a long-range Sub-1 GHz wireless network.	 Implement a UART-to-BLE bridge to communicate serial data wirelessly and bi-directionally between a wired UART and a device supporting BLE protocol.	 Single-chip implementation of RTP video streaming + Wi-Fi connection on the SimpleLink CC3200 Wi-Fi wireless microcontroller over 802.11 b/g/n networks from any smart phone, tablet or computer over local network.

More designs are available at [www.ti.com/tidesigns](http://www.ti.com/tidesigns)

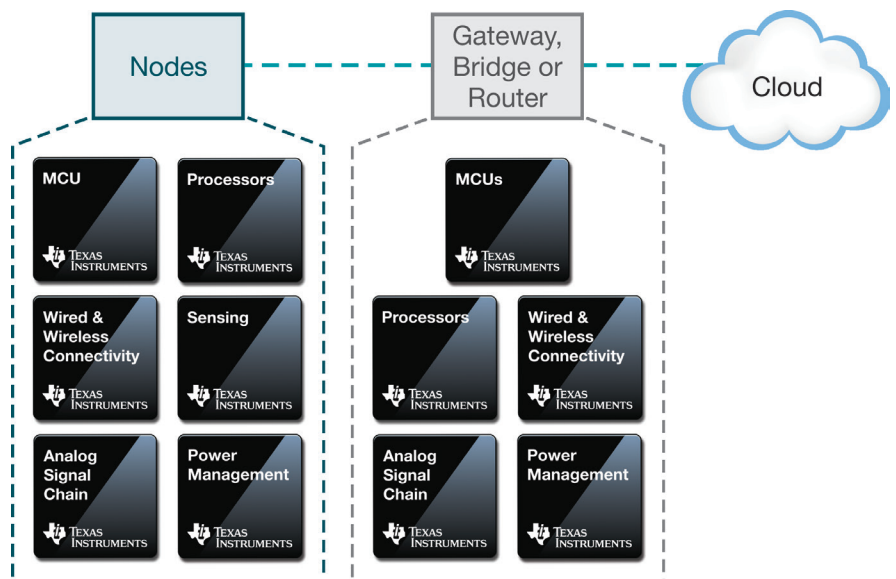
## The Internet of Things

With the potential of having billions of devices connected to the cloud in the next decade, the **Internet of Things (IoT)** will be part of every aspect of our lives. TI is the only semiconductor company with all of the building blocks to enable the IoT. Our end-to-end solutions offer the simplest path for innovators to turn IoT concepts into reality. TI's broad range of embedded processing and connectivity products spans IoT application segments ranging from ultra-low-power endpoints to gateways. Additionally, the BeagleBone and LaunchPad™ development ecosystems enable developers to quickly snap together meaningful hardware prototypes without the need to create a design from scratch.

### Only TI has all the IoT building blocks

From wearables and home automation to smart factories and cities, the IoT touches every facet of our lives. TI makes the process of connecting to the cloud simpler by developing integrated hardware and software solutions combined with support at every step of the way. With the industry's broadest portfolio of wireless connectivity, sensing, microcontrollers, processors, power management and analog IO solutions, TI can support your IoT design with innovative, low-power and easy-to-use solutions.

### ► End-to-end solutions for the IoT



### End-to-end cloud-ready partners

IBM Watson IoT



Microsoft Azure



Parse

PTC®

PubNub®



vitanet




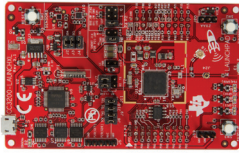
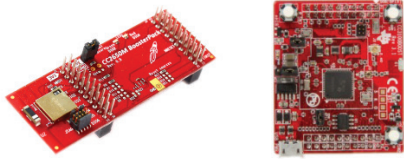
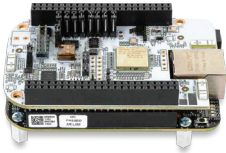
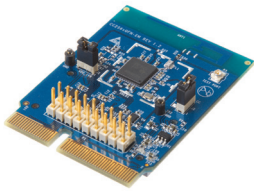
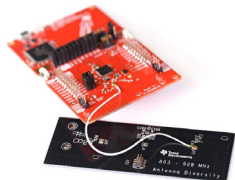
### Cloud partners enable easy adoption

Manufacturers need proven hardware, software and an easy way to connect to the cloud to manage services and capitalize on the growing IoT market. In order to provide a vetted solution, TI established an ecosystem of cloud providers who support our connected devices and allow engineers to quickly and easily connect to the cloud. Each member of the ecosystem has demonstrated its cloud service offering on one or more of TI's wireless connectivity, MCU and processor solutions.

Visit [www.ti.com/IoT](http://www.ti.com/IoT) to learn more about the IoT cloud ecosystem members and their offerings as well as the variety of tools and support TI offers.

## Development boards

Immediately start evaluating and developing with an optimized development kit. We have invested in a number of options to meet your specific development needs including:

SensorTag Kit	LaunchPad™	BoosterPack
		
<b>SensorTag Kit</b> The SimpleLink™ SensorTag kit allows quick and easy prototyping of IoT devices connecting 10 sensors to the cloud in three minutes. Get started with <i>Bluetooth®</i> low energy, Sub-1 GHz and IEEE 802.15.4-based protocols (e.g., 6LoWPAN, ZigBee®, etc.) now. <ul style="list-style-type: none"> <li>• <b>CC2650STK</b></li> <li>• <b>CC1350STK</b></li> </ul>	<b>LaunchPad</b> TI development platform ecosystem suitable for SimpleLink Wireless MCUs. <ul style="list-style-type: none"> <li>• <b>LAUNCHXL-CC2650</b></li> <li>• <b>LAUNCHXL-CC1350</b></li> <li>• <b>LAUNCHXL-CC1310</b></li> <li>• <b>CC3200-LAUNCHXL</b></li> <li>• <b>CC3200MODLAUNCHXL</b></li> <li>• <b>LAUNCHXL-CC2640R2</b></li> </ul>	<b>BoosterPack</b> Complete RF development platform to evaluate the SimpleLink Wi-Fi CC3100 and SimpleLink ultra-low-power CC2650/CC2640 wireless microcontrollers. Plugs on top of LaunchPad. <ul style="list-style-type: none"> <li>• <b>BOOSTXL-CC2650MA</b></li> <li>• <b>CC3100BOOST</b></li> </ul>
WiLink™ Combo Solutions	Dual-Mode Bluetooth	Antenna Kit
		
<b>BeagleBone Black and Wireless Cape</b> TI and Element14 have teamed up to create a combo Wi-Fi, Bluetooth, ZigBee and NFC cape for the BeagleBone Black featuring the WiLink WL1837MOD. <ul style="list-style-type: none"> <li>• <b>BeagleBone Black + Wireless Cape</b></li> </ul>	<b>Dual-Mode Bluetooth EVMs</b> These evaluation module boards are based on the TI CC256x device with QFN package and can support Dual-Mode Bluetooth (Bluetooth/Bluetooth low energy). <ul style="list-style-type: none"> <li>• <b>CC2564MODAEM</b></li> <li>• <b>CC2564MODNEM</b></li> <li>• <b>CC256XQFNEM</b></li> </ul>	<b>Antenna Kit</b> The antenna kit includes 16 antennae for frequencies from 169 MHz to 2.4 GHz including PCB antennae, helical antennae and chip antennae. <ul style="list-style-type: none"> <li>• <b>CC-ANTENNA-DK2</b></li> </ul>

The complete portfolio of tools is available at [www.ti.com/wireless](http://www.ti.com/wireless)

The red bar, Code Composer Studio, E2E, Internet-on-a-chip, SimpleLink, Sitara, SmartRF, Tag-it and Z-Stack are trademarks of Texas Instruments. All trademarks are the property of their respective owners.



## IMPORTANT NOTICE FOR TI DESIGN INFORMATION AND RESOURCES

Texas Instruments Incorporated ("TI") technical, application or other design advice, services or information, including, but not limited to, reference designs and materials relating to evaluation modules, (collectively, "TI Resources") are intended to assist designers who are developing applications that incorporate TI products; by downloading, accessing or using any particular TI Resource in any way, you (individually or, if you are acting on behalf of a company, your company) agree to use it solely for this purpose and subject to the terms of this Notice.

TI's provision of TI Resources does not expand or otherwise alter TI's applicable published warranties or warranty disclaimers for TI products, and no additional obligations or liabilities arise from TI providing such TI Resources. TI reserves the right to make corrections, enhancements, improvements and other changes to its TI Resources.

You understand and agree that you remain responsible for using your independent analysis, evaluation and judgment in designing your applications and that you have full and exclusive responsibility to assure the safety of your applications and compliance of your applications (and of all TI products used in or for your applications) with all applicable regulations, laws and other applicable requirements. You represent that, with respect to your applications, you have all the necessary expertise to create and implement safeguards that (1) anticipate dangerous consequences of failures, (2) monitor failures and their consequences, and (3) lessen the likelihood of failures that might cause harm and take appropriate actions. You agree that prior to using or distributing any applications that include TI products, you will thoroughly test such applications and the functionality of such TI products as used in such applications. TI has not conducted any testing other than that specifically described in the published documentation for a particular TI Resource.

You are authorized to use, copy and modify any individual TI Resource only in connection with the development of applications that include the TI product(s) identified in such TI Resource. NO OTHER LICENSE, EXPRESS OR IMPLIED, BY ESTOPPEL OR OTHERWISE TO ANY OTHER TI INTELLECTUAL PROPERTY RIGHT, AND NO LICENSE TO ANY TECHNOLOGY OR INTELLECTUAL PROPERTY RIGHT OF TI OR ANY THIRD PARTY IS GRANTED HEREIN, including but not limited to any patent right, copyright, mask work right, or other intellectual property right relating to any combination, machine, or process in which TI products or services are used. Information regarding or referencing third-party products or services does not constitute a license to use such products or services, or a warranty or endorsement thereof. Use of TI Resources may require a license from a third party under the patents or other intellectual property of the third party, or a license from TI under the patents or other intellectual property of TI.

TI RESOURCES ARE PROVIDED "AS IS" AND WITH ALL FAULTS. TI DISCLAIMS ALL OTHER WARRANTIES OR REPRESENTATIONS, EXPRESS OR IMPLIED, REGARDING TI RESOURCES OR USE THEREOF, INCLUDING BUT NOT LIMITED TO ACCURACY OR COMPLETENESS, TITLE, ANY EPIDEMIC FAILURE WARRANTY AND ANY IMPLIED WARRANTIES OF MERCHANTABILITY, FITNESS FOR A PARTICULAR PURPOSE, AND NON-INFRINGEMENT OF ANY THIRD PARTY INTELLECTUAL PROPERTY RIGHTS.

TI SHALL NOT BE LIABLE FOR AND SHALL NOT DEFEND OR INDEMNIFY YOU AGAINST ANY CLAIM, INCLUDING BUT NOT LIMITED TO ANY INFRINGEMENT CLAIM THAT RELATES TO OR IS BASED ON ANY COMBINATION OF PRODUCTS EVEN IF DESCRIBED IN TI RESOURCES OR OTHERWISE. IN NO EVENT SHALL TI BE LIABLE FOR ANY ACTUAL, DIRECT, SPECIAL, COLLATERAL, INDIRECT, PUNITIVE, INCIDENTAL, CONSEQUENTIAL OR EXEMPLARY DAMAGES IN CONNECTION WITH OR ARISING OUT OF TI RESOURCES OR USE THEREOF, AND REGARDLESS OF WHETHER TI HAS BEEN ADVISED OF THE POSSIBILITY OF SUCH DAMAGES.

You agree to fully indemnify TI and its representatives against any damages, costs, losses, and/or liabilities arising out of your non-compliance with the terms and provisions of this Notice.

This Notice applies to TI Resources. Additional terms apply to the use and purchase of certain types of materials, TI products and services. These include; without limitation, TI's standard terms for semiconductor products (<http://www.ti.com/sc/docs/stdterms.htm>), [evaluation modules](#), and [samples](http://www.ti.com/sc/docs/sampterm.htm) (<http://www.ti.com/sc/docs/sampterm.htm>).

Mailing Address: Texas Instruments, Post Office Box 655303, Dallas, Texas 75265  
Copyright © 2017, Texas Instruments Incorporated