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 salesperson or field applications engineer

New Product Update:
Wi-SUN FAN 1.0 – Quick start to TI full stack

Rogerio Almeida

September 2021

Texas Instruments

Agenda

- Overview of TI SW solutions
- Wi-SUN Overview
  - FAN 1.0
  - FAN 1.1
- TI Solutions for Wi-SUN
  - Certifications
  - Architecture options for smart meter
  - TI solution benefits
- Getting started with TI Wi-SUN FAN 1.0 solution
  - SDK
  - EVMs

Sub-1 GHz software solutions

IEEE 802.15.4: TI 15.4 Stack

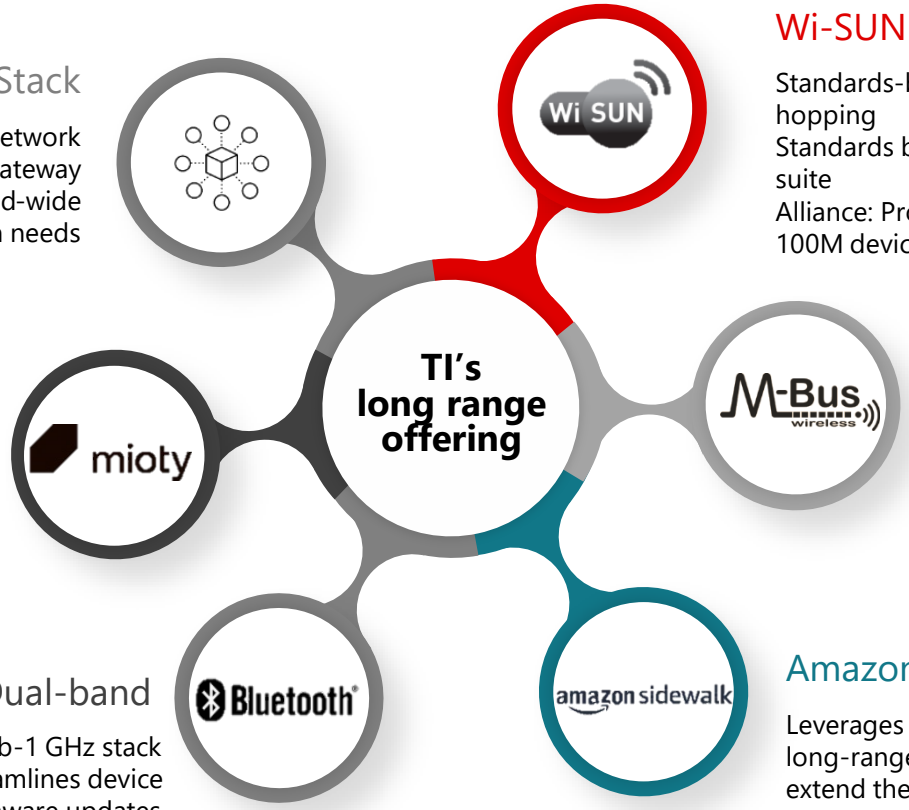
Complete standards based star network
Low-power end nodes & gateway
Many RF PHYs to choose from for world-wide regulatory compliance & application needs

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



Wi-SUN

Standards-based robust mesh network, frequency hopping
Standards based multi-layer security & IPv6 protocol suite
Alliance: Promoter >300 members from 46 countries, 100M 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

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Wi-SUN | Resilient & secure mesh network

What is Wi-SUN?

- Wireless protocol Alliance with 300+ members from 46 countries
- IPv6 protocol suite with multi-layer security
- Key applications include smart utilities, smart grid, smart city, connected street & traffic lights

Benefits

- Self-healing mesh network with frequency hopping providing high level of robustness
- Sub-1GHz frequency bands with dedicated PHYs per region for longest range
- Certified products with multi-vendor interoperability

TI Advantage

- Cost optimized, small solution – lowest flash footprint
- Extremely low standby current (0.85uA)
- Highly efficient integrated PA (25% lower TX current at +20dBm vs. market)
- Seamless HW migration to larger memory devices for complete network solution

Getting Started

- Build a rapid prototype with $30 LaunchPad SensorTag

- Expand to full development with LaunchPads

Applications

Wi-SUN Alliance – Key Focus areas

- **FAN (Field Area Network) :** Sub 1GHz Mesh solution across – Global coverage
  - Connecting a large number of devices for Smart Metering, Street lighting etc..
  - FAN1.0 – Only supports FSK data rate, non-sleepy devices
  - FAN1.1 - Supports sleepy end devices (water meter / gas meter), multi-rate, additional 800MHz and 900MHz region support, Japan, Brazil, EU and NA to include regional 2FSK PHYs and regional OFDM PHYs
- **HAN (Home Area Network) :** direct & 1-hop link – Japan
  - Connecting electricity meter (already part of some WAN like cellular network) to a HEMS (Home energy management system) and then to devices inside home

Wi-SUN 1.0 Certifications

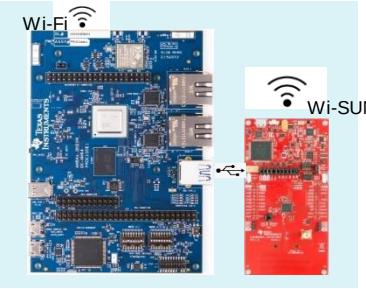
- Wi-SUN PHY Certification
  - Regions: North America, Brazil, Europe, India, Singapore
  - Devices: CC13x2R1, CC13x2P1 CC13x2R7, CC13x2P7
  - Modes: 1a, 1b, 2a, 3
- Wi-SUN Router Certification
  - Region: North America, Brazil
  - Devices: CC13x2R1, CC13x2P1 CC13x2R7, CC13x2P7
- Wi-SUN Border Router Certification
  - Region: North America, Brazil
  - Devices: CC13x2R7, CC13x2P7

Table 3-1. Wi-SUN® PHYs and TI Support Overview

Symbol Rate (ksymbol/s)	Modulation Index	Wi-SUN® Mode	Frequency Bands	Regulatory Compliance Targets	Mandatory Wi-SUN® FAN 1.0 PHY	Support
50	0.5	#1a	EU	EN300 220	Yes	Yes
	1.0	#1b	NA	FCC 15.247	Yes	Yes
100	0.5	#2a	EU and NA	EN300 220 FCC 15.247	Yes	Yes
	1.0	#2b	JP	ARIB STD-108	No	Yes
150	0.5	#3	NA and JP	FCC 15.247 ARIB STD-T108	Yes	Yes
200	0.5	#4a	NA	FCC15.247	No	Yes
	1.0	#4b	JP	ARIB STD-T108	No	Yes
300	0.5	#5	NA and JP	FCC15.247 ARIB STD-T108	No	No (Coming later)

Competitive analysis

- TI is addressing the growing WI-SUN market by releasing a portfolio of SW and HW products ranging from 352K of Flash up to 1M of Flash along with a comprehensive SW offering of PHY/MAC and FAN level deliverables.
- We have a comprehensive certification strategy where we certify our products at the WI-SUN alliance at all 3 levels.
- Low-cost development kits are be available world wide for initial development



Wi-SUN Border Router

	TI	Comp A	Comp B
HW solution	SoC	SoC	SoC
Tools	ARM tool chain	proprietary tool chain	ARM tool chain
CPU CORE	48MHz ARM core	32MHz Proprietary core	ARM core
SW	MAC/FAN	MAC/FAN	MAC/FAN
Stack	Open FAN stack	Proprietary	Open FAN stack
PHY Supported Regions	US/BZ/EU/IN/SG/JP	US/BZ/EU/IN/SG/JP	US/BZ
Router	US/BZ	US/BZ	US/BZ
Border Router	US/BZ	US/BZ	-
Access	Full download available	Need to buy development kit	Need to buy development kit

TI Wi-SUN Certificates

Certificates:

PHYs

- https://wi-sun.org/product/wsa0260-texas-instruments-cc13x2r-p/
- https://wi-sun.org/product/wsa0261-texas-instruments-cc13x2r7-p7/
- https://wi-sun.org/product/wsa0262-texas-instruments-cc13x2r-p/
- https://wi-sun.org/product/wsa0263-texas-instruments-cc13x2r7-p7/

FAN profile

- WSA0272 - Texas Instruments CC13x2R/P - Wi-SUN Alliance
- WSA0273 - Texas Instruments CC13x2R7/P7 - Wi-SUN Alliance

FAN profile

- Border Router Certificate will become available soon

Wi SUN

Product Certificate

This certificate lists the features that have successfully completed Wi-SUN Alliance Conformance and Interoperability Testing conducted at a Wi-SUN Approved Test Laboratory

For details, see www.wi-sun.org

Certification Identifier: **WSA 0273**

Date of Certification: **August 9, 2021**

Company Name: **Texas Instruments, Inc.**

Product Name: **CC13x2R7/P7**

Model Number: Model Number: **CC1312R7/CC1352P7**

Hardware Version: **1.1**

Firmware Version: **1.0**

Product Category: **Radio Module (FAN Router Communications Device)**

Product Profile: **Wi-SUN Profile for FAN (Router)**

Frequency Band(s): **902-928MHz (US/BZ)**

Certification Summary

CRSL Version Number: **CRSL 1V29**

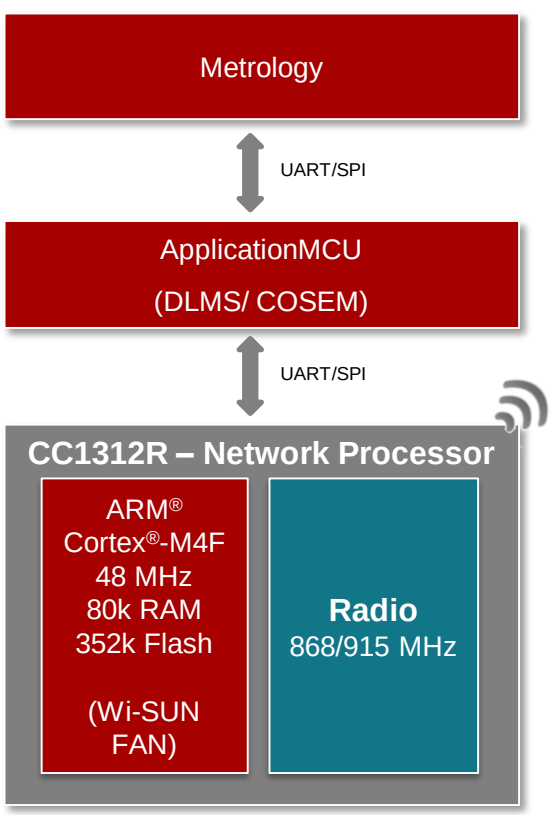
CRSL Date: **August 3, 2021**

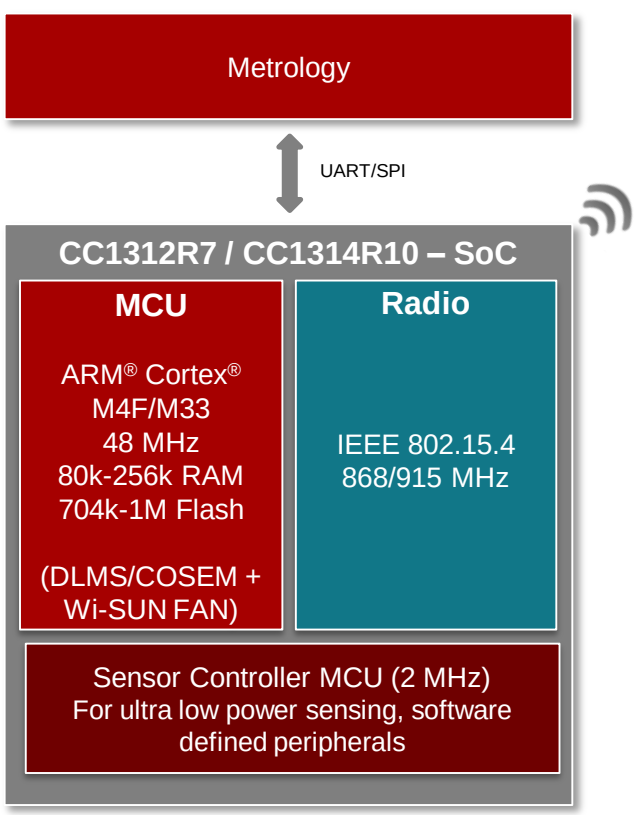
For and on behalf of Wi-SUN Alliance:

Chin-Sean Sum,
Certification Program Manager

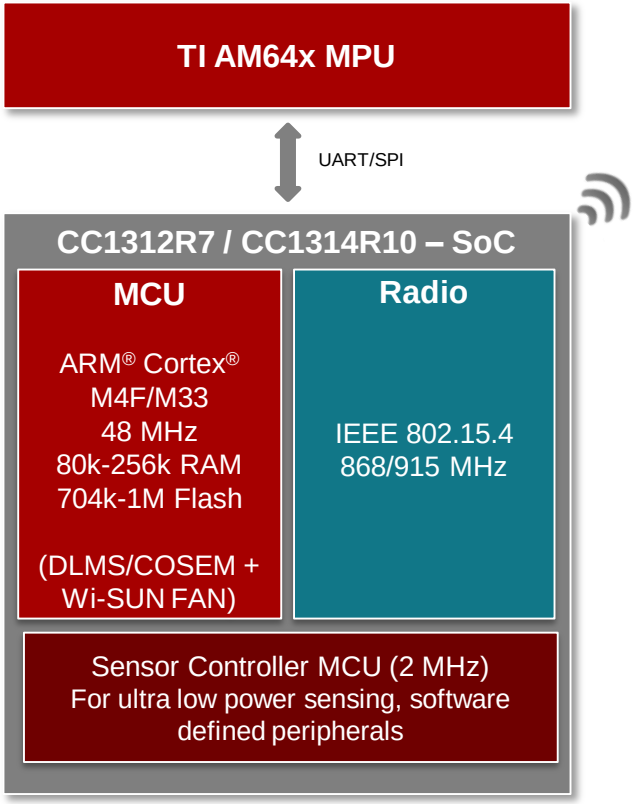
TS

Wi-SUN | Smart-meter Router Node Architecture options



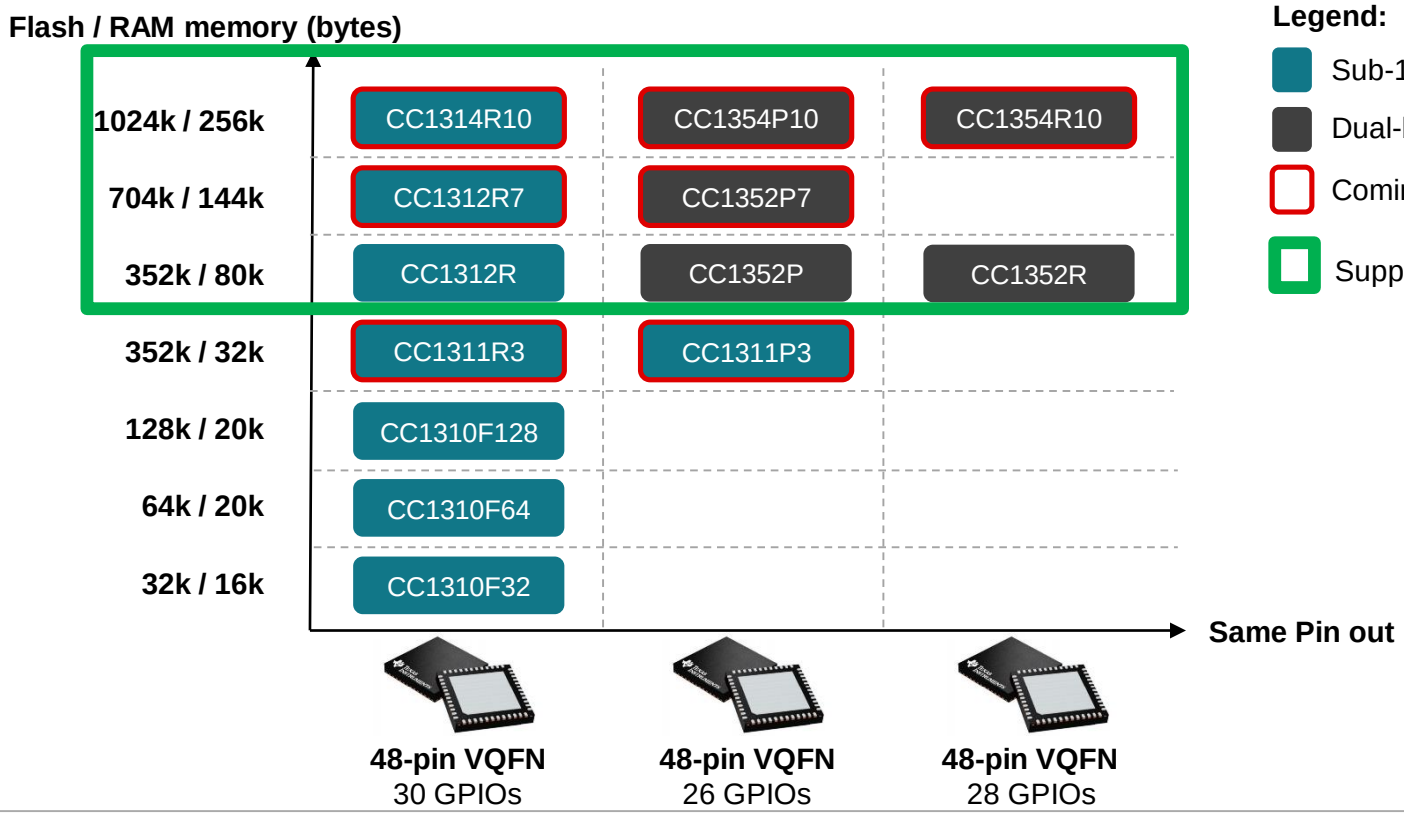


Wi-SUN | Smart-meter Border Router Architecture



Most scalable Sub-1 GHz portfolio

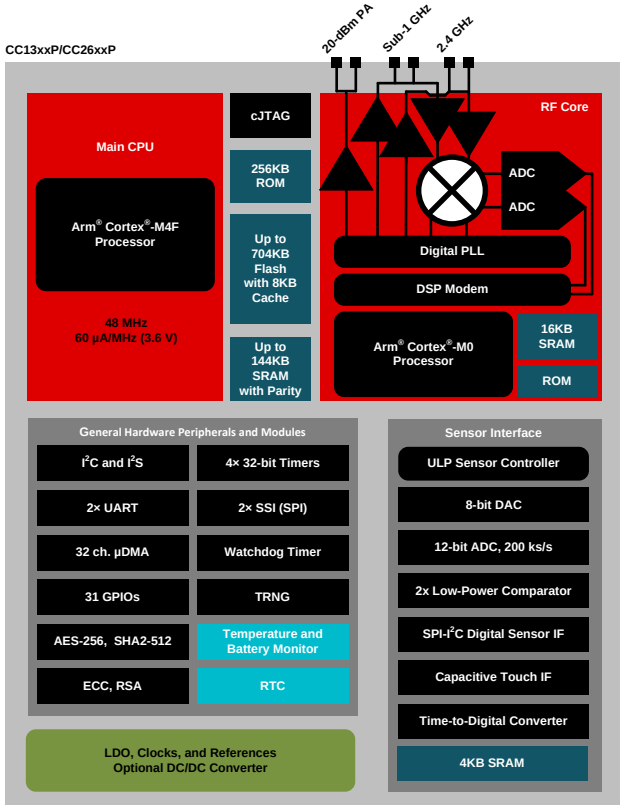
Pin & API compatible



Legend:

- Sub-1 GHz
- Dual-band Sub-1 GHz + 2.4 GHz
- Coming soon!
- Support Wi-SUN

Expanded memory with CC1312R7 & CC1352P7



Key Features

Teal text = Changes vs CC13x2

RF Performance

- Excellent RF performance: upto 130dBm link budget @ 50kbps, 868 MHz
- Narrowband long range: upto 141dBm link budget @ 2.5kbps, 868 MHz
- Bluetooth 5 LE coded PHY with -105dBm sensitivity
- Sub-1GHz, 2.4 GHz and true dual band support with dedicated RF ports
- BLE 5, Zigbee, Thread and 2.4ghz proprietary protocol support
- +20 dBm power amplifier with industry lowest power consumption
- 868 MHz, 915Mhz, 433Mhz, 169 Mhz and 2.4Ghz ISM band support

MCU

- Powerful ARM Cortex-M4F @ 48Mhz
- 704 kB dual-bank Flash memory + 256 KB ROM
- Components in ROM: 15.4 MAC, RTOS & drivers
- 144kB ultra low leakage SRAM protected by parity for low soft error rate

Security

- Crypto hardware acceleration, AES-128/256, SHA-256, ECC, RSA-2048)

Ultra Low power

- MCU: 2.9 mA at 48MHz
- RX: 5.8 mA (868 MHz)
- TX at +14 dBm: 24.9 mA (868 MHz)
- Standby: 0.95 µA (RTC on, 144KB RAM and CPU retention)
- Shutdown: 150 nA (wakeup on external events)
- Ultra-low power sensor controller

Devices & Package

- CC1312R7: Sub1-Ghz wireless MCU with +14dBm TX
- CC1352P7: Dual-band wirelsss MCU with +20dBm TX
- 7x7mm QFN (upto 31 GPIOs) pin compatible with CC1310/11

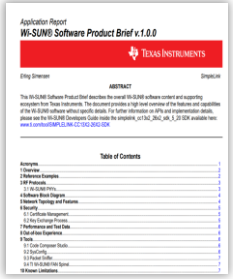
TI Wi-SUN Stack | Available now!

[Wi-SUN | Overview | Wireless Connectivity | TI.com]

Connect video

Learn from TI & market leader, L+G, about the benefits of Wi-SUN & how it's shaping the future of smart grid

Software product brief



Learn from the RF experts the features & capabilities of TI's new Wi-SUN FAN 1.0 certified stack

TI Git Hub

a. https://github.com/TexasInstruments/ti-wisunfan-pyspinel --> available since Q2 (Python based NWP Interface tool)

b. https://github.com/TexasInstruments/ti-wisunfantund --> available soon (Linux GW tools support)

Webinar

Explore how to extend your wireless connectivity with Wi-SUN, a resilient, self-healing, mesh technology

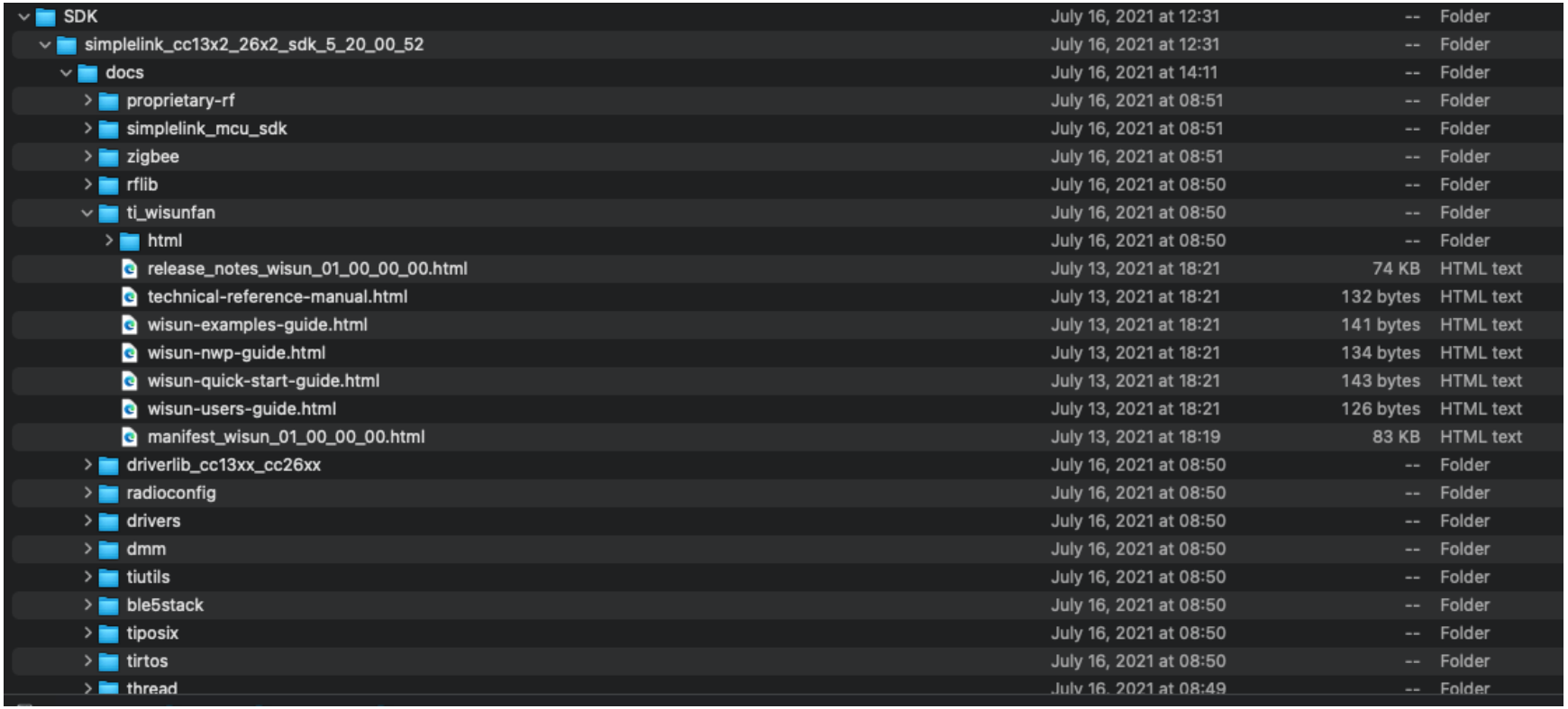
Technical blog

Read more about the benefits of Wi-SUN, and why to use TI Certified Stack

Demo video

See Wi-SUN in action with TI's "light my path" demo video for smart cities & connected street lights

Where is documentation located inside SDK?

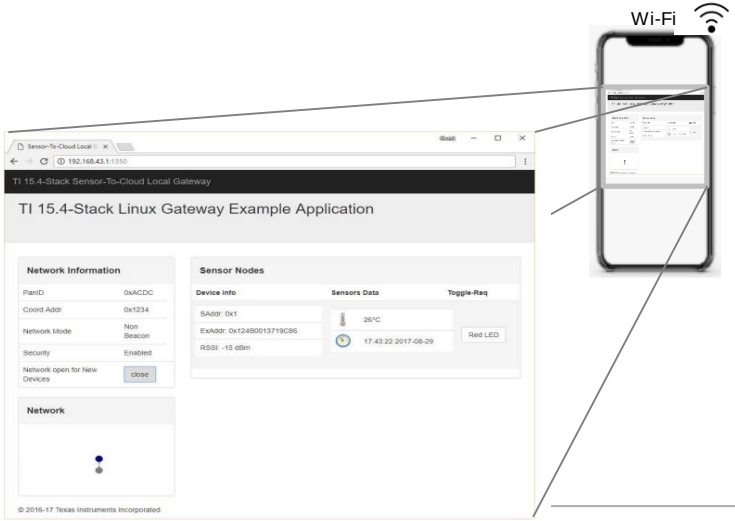


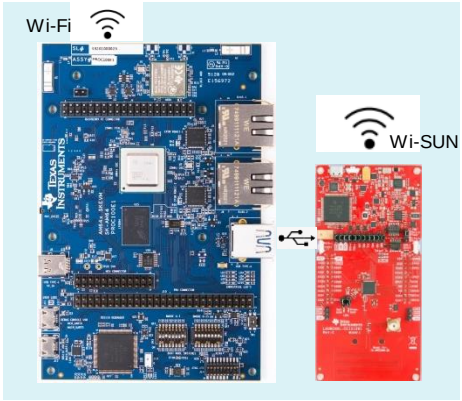
TI Wi-SUN Development Kit – WWW.ti.com/wisun

Wi-SUN development kit includes TI CC1352P7 Launch Pads and AM64x based Linux border router running a simple web server for display of network topology and simple interaction (e.g. toggle LED)

CC1352P7 is recommended due integrated PA available, but customers can test it with CC1312R7 as well.

- Kit Contents
  - 2x LAUNCHXL-CC1352P7 LaunchPad™ as Wi-SUN Nodes
  - 1x LAUNCHXL-CC1352P7 LaunchPad™ as Wi-SUN Border Router
  - 1x AM64 Starter Kit EVM as Wi-SUN Linux Border Router





Wi-SUN Border Router

Wi-SUN Nodes

Visit www.ti.com/npu

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

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