CC3100 SimpleLink™ Wi-Fi® Network Processor and Internet-of-Things Solution for MCU Applications

Pre-production devices and
Software Development Kit (SDK) v0.5.2 Release Notes

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1 Introduction

This document describes the pre-production Software Development Kit (SDK) version 0.5.2 for use with the pre-production CC3100 SimpleLink Wi-Fi Network Processor device mounted on the CC3100 BoosterPack development platform.

This pre-production release of the SDK and the CC3100 device has minor performance limitations which are listed as errata in section 8 of this document.

Texas Instruments will release the production version of the CC3100 device with updated development boards and an updated SDK during summer of 2014.

2 Getting Started

Please follow the on-line CC3100 Quick Start Guide to start using the CC3100 BoosterPack development platform.

Please download the CC3100 Getting Started Guide to get started with your project development.

3 Release Content

Item	Version	Type
Device	XCC3100HZ	Pre-production device
Development boards	CC3100BOOST Rev3.3 with CC31XXEMUBOOST Board Rev3.0	Orderable from TI
SDK Installer	CC3100SDK-0.5.2-windows-installer.exe For Windows 7 and Windows XP	Provided with a click wrap license
Firmware	2.0.7.0.31.0.0.4.2.1.5.3.3	Binary, pre-flashed on the CC3100BOOST board
Reference host platform	MSP430F5529 Launch Pad MSP430FRAM5739 Experimenter Board Rev 1.1 MSP430F5529 Experimenter Board TM4C123GH6PM Launchpad	Orderable from TI
Network Processor Host driver	Version 0.5.1	Source code
Supported IDE	IAR version 6.10 for MSP430 IAR version 7.20 for TM4C123 CCS version 6.0 MS Visual Studio Express 2010 for PC & SimpleLink Studio Eclipse 4.3.0 for PC and SimpleLink Studio	Delivered separately
Demo	Embedded HTML web-site	Pre-flashed on Booster Pack and source code provided
User guides	CC3100 Getting started guide CC3100 BoosterPack User Guide SimpleLink Host Driver Programmer's Guide	PDF PDF Doxygen HTML
Tools	USB Drivers for CC31XXEMUBOOST board for Windows 7	Executable

4 Directory structure of SDK

Double-Click on the package to copy the directories (and files) to the preferred location. The first level directory structure is as shown in the table below.

Directory Name	Content
Docs	• Getting Started Guide for application development • Boards User Guide • SimpleLink Host Driver Programmer's Guide • Application notes for sample applications
Examples	Example application in source code

Platform	• MSP430FR55529lp
	  ○ CCS projects for all sample applications
	  ○ IAR projects for getting started applications
	  ○ Drivers
	  ○ Simplelink Host Driver Platform Configuration file (user.h)
	• MSP430FR5529, TM4C123GH6PM, MSP430FR5739
	  ○ CCS and IAR projects for getting started applications
	  ○ Drivers
	  ○ Simplelink Host Driver Platform Configuration file (user.h)
	• simplelinkstudio:
	  ○ Visual-Studio Express and Eclipse projects for sample applications
	  ○ Simplelink Host Driver Platform Configuration file (user.h)

SimpleLink	• The SimpleLink Network Processor host driver code. • template_user.h file to be modified by the user for porting the driver to any host platform
Tools	**cc31xx_board_drivers:** USB Drivers for Windows 7 to enable application development on a PC using SimpleLink Studio for CC3100

5 Networking features

5.1 Wi-Fi

Standards	802.11b/g/n **Station** and Wi-Fi Direct **Client**
Supported Channels	1-13
Personal Security	WEP, WPA and WPA2
Enterprise Security	WPA-2 Enterprise EAP Fast, EAP PEAPv0 MSCHAPv2, EAP PEAPv0 TLS, EAP PEAPv1 TLS, EAP TLS, EAP TTLS TLS, EAP TTLS MSCHAPv2
Provisioning	SmartConfig™ technology Wi-Fi Protected Setup (WPS2) Access Point mode with internal HTTP Web Server

Standards	802.11b/g **Access Point** and Wi-Fi Direct **Group Owner**
Clients	1
Personal Security	WEP, WPA and WPA2

5.2 Networking protocols

IP	IPv4	
Transport	UDP TCP RAW ICMP	
Cross-Layer	DHCP ARP DNS	
Application	mDNS DNS-SD HTTP 1.0 web server	
Transport Layer Security	SSLV3 SSLV3 TLSV1 TLSV1 TLSV1 TLSV1 TLSV1 TLSV1 TLSV1_1 TLSV1_1 TLSV1_1 TLSV1_1	SSL_RSA_WITH_RC4_128_SHA SSL_RSA_WITH_RC4_128_MD5 TLS_RSA_WITH_RC4_128_SHA TLS_RSA_WITH_RC4_128_MD5 TLS_RSA_WITH_AES_256_CBC_SHA TLS_DHE_RSA_WITH_AES_256_CBC_SHA TLS_ECDHE_RSA_WITH_RC4_128_SHA TLS_ECDHE_RSA_WITH_AES_256_CBC_SHA TLS_RSA_WITH_RC4_128_SHA TLS_RSA_WITH_RC4_128_MD5 TLS_RSA_WITH_AES_256_CBC_SHA TLS_DHE_RSA_WITH_AES_256_CBC_SHA

	TLSV1_1	TLS_ECDHE_RSA_WITH_RC4_128_SHA
	TLSV1_1	TLS_ECDHE_RSA_WITH_AES_256_CBC_SHA
	TLSV1_2	TLS_RSA_WITH_RC4_128_SHA
	TLSV1_2	TLS_RSA_WITH_RC4_128_MD5
	TLSV1_2	TLS_RSA_WITH_AES_256_CBC_SHA
	TLSV1_2	TLS_DHE_RSA_WITH_AES_256_CBC_SHA
	TLSV1_2	TLS_ECDHE_RSA_WITH_RC4_128_SHA
	TLSV1_2	TLS_ECDHE_RSA_WITH_AES_256_CBC_SHA
User application sockets	Up to 8 open sockets Up to 2 secured application sockets: - One server (listen socket and accept socket) + client (data socket) - Up to two clients (data socket)	

5.3 Advanced Features

802.11 Transceiver	Transmit and Receive raw Wi-Fi packets with full control over payload. Wi-Fi disconnect mode. Can be used for general-purpose applications (e.g. tags, sniffer, RF tests)
Traffic Filters	Embedded filters to reduce power consumption and Wake-on-LAN trigger packets (IP and MAC layer)

5.4 Power modes

Low Power mode	Uses 802.11 Power Save and Device Deep Sleep Power with three user configurable policies
Configurable Power Policies	• Normal (Default) - Best tradeoff between traffic delivery time and power performance • Low power –Used only for Transceiver mode application (Disconnect mode) • Long Sleep Interval – wakes up for the next DTIM after a configurable sleep interval, up to 2 seconds. This policy is only applicable for client socket mode

6 Advanced information

- Endianess
  - Supports Little Endianness
  - Supports Big Endianness auto detection for SPI interface
  - 8/16/32 bit modes are supported
- TCP/IP
  - TCP Window size is 16KB, divided between application sockets.
  - IP Fragmentation is not supported for Tx UDP and RAW sockets
  - Max Tx payload for Raw packet with IP header is 1460 bytes
  - Max Tx payload for Raw Transceiver is 1488 bytes
- SSL/TLS Certificates
  - Certificate Authority (CA) certificates needs to be installed if server authentication is required
  - CA Certificate key size up to 2048 bit
- WEP
  - Supporting only WEP open using ASCII pre shared key
- WPS
  - Up to 4 seconds delay between association and EAPOL-Start
- SmartConfig
  - Not supported with 5GHz AP (802.11a/n/ac)
  - Not supported for MIMO-capable configuration devices
  - Only Group 0 is supported in auto start mode
- Tx Power
  - Tx power in AP mode takes effect only after reset
- Wi-Fi Direct
  - In Group Owner mode FAST connection policy has to be set to TRUE
- Rx Filters
  - BSSID can't be filtered while STA is connected (if filtered will cause disconnection)
- Power Management
  - The device will remain in active after initialization until the host reads all events
- File System
  - Up to 100 user files, file size is not limited
- Serial Flash
  CC3100 supports JEDEC specification compliant Serial Flash devices with 4Kbyte sector size erase. The following parts were validated:

Micron	N25Q128-A13BSE40	128Mbit
Spansion	S25FL208K	8Mbit
Winbond	W25Q16V	16Mbit
Adesto	AT25DF081A	8Mbit
Macronix	MX25L12835F-M2	128Mbit

7 Sample applications

The release package includes sample applications created for the MSP430FF5529 Launchpad including:

- Application Notes explaining the functionality usage
- Project file for IAR and CCS
- Smartphone application as needed

Some of the sample applications are also provided for MSP430F5739, TM4C123GH6PM and SimpleLink Studio on a PC environment. All the applications can be easily ported to other MCUs and host processors. Recommend to use “Getting Started in STA mode” application as sample reference code to write new application.

7.1 Antenna Selection

This is a reference implementation for antenna-selection scheme running on the host MCU, to enable improved radio performance inside buildings

7.2 Connection Policies

This application demonstrates the usage of the CC3100 profiles and connection-policies.

7.3 Send Email

This application sends an email using SMTP to a user-configurable email address at the push of a button.

7.4 Enterprise Network Connection

This application demonstrates the procedure for connecting the CC3100 to an enterprise network.

7.5 File System

This application demonstrates the use of the file system API to read and write files from the serial Flash.

7.6 Get Time

This application connects to an SNTP cloud server and receives the accurate time.

7.7 Get Weather

This application connects to ‘Open Weather Map’ cloud service and receives weather data.

7.8 Getting Started in AP Mode

This application configures the CC3100 in AP mode. It verifies the connection by pinging the connected client.

7.9 Getting Started in STA Mode

This application configures the CC3100 in STA mode. It verifies the connection by pinging the connected Access Point.

7.10 HTTP Server

This application demonstrates using the on-chip HTTP Server APIs to enable static and dynamic web page content.

7.11 IP Configuration

This application demonstrates how to enable static IP configuration instead of using DHCP.

7.12 MDNS

This application registers the service for broadcasting and attempts to get the service by the name broadcasted by another device.

7.13 Mode Configuration

This application demonstrates switching between STA and AP modes.

7.14 NWP Filters

This application demonstrates the configuration of Rx-filtering to reduce the amount of traffic transferred to the host, and to achieve lower power consumption.

7.15 NWP Power Policy

This application shows how to enable different power policies to reduce power consumption based on use case in the station mode.

7.16 P2P (Wi-Fi Direct)

This application configures the device in P2P (Wi-Fi Direct) mode and demonstrates how to communicate with a remote peer device.

7.17 Provisioning AP

This application demonstrates the use of the on Chip HTTP server for Wi-Fi provisioning in AP Mode, building upon example application 7.8 above.

7.18 Provisioning with SmartConfig

This application demonstrates the usage of TI's SmartConfig™ Wi-Fi provisioning technology. The *Wi-Fi Starter Application* for iOS and Android is required to use this application. It can be downloaded from following link: http://www.ti.com/tool/wifistarter or from the Apple App store and Google Play.

7.19 Provisioning with WPS

This application demonstrates the usage of WPS Wi-Fi provisioning with CC3100.

7.20 Scan Policy

The application demonstrates the scan-policy settings in CC3100.

7.21 SPI Diagnostics Tool

This is a diagnostics application for troubleshooting the host SPI configuration.

7.22 SSL/TLS

The application demonstrates the usage of certificates with SSL/TLS for application traffic privacy and device or user authentication

7.23 TCP Socket

The application demonstrates simple connection with TCP traffic.

7.24 Transceiver Mode

The application demonstrates the CC3100 transceiver mode of operation.

7.25 UDP Socket

The application demonstrates simple connection with UDP traffic.

7.26 XMPP Client

The application demonstrates instant messaging using a cloud based XMPP server.

7.27 File Download

This application demonstrates file download from a cloud server to the on board serial Flash.

7.28 Out-of-box

This application demonstrates Out-of-Box experience with CC3100 Booster Pack

8 Revision History

SDK Version	Updates from previous version
0.5.2	• Added a function to configure the firmware to default state across all applications. • Added error handling to Host driver API calls in application “Getting Started_in STA mode”. This can be used as sample reference code for writing new application. • Added CLI interface to MSP430F5529LP application to enable log prints.
0.5.1	First Release

9 Errata

The following section covers known issues and performance limitations with SDK 0.5.2 and the CC3100 pre-production devices. TI will release the CC3100 production devices with SDK 1.0.0 during summer 2014 that will remove some of the limitations as described ahead.

9.1 Hardware

9.1.1 Pre-regulated 3.3v to Pin 47

For preproduction devices connect an external pre-regulated 3.3v +/- 5% supply to pin 47 (VDD_ANA2). This adds 12mA average current and up to 100mA peak current over 20uSec to the total system current at 3.3V.

The CC3100 BoosterPack version 3.3 already includes the correct supply configuration for the pre-production device and also adds a 10uF capacitor to filter the peak currents. No further action is required.

The external 3.3V supply is not required in the CC3100 production device in which case pin 47 should be left not connected.

9.1.2 Power consumption increase

Power consumption of the CC3100 pre-production device in all active modes is 1-2 mA higher compared to the CC3100 production devices

9.2 Performance

Item	SDK 0.5.2	SDK 1.0.0**
Maximum SPI clock speed	14 MHz	20 MHz
Init time from hibernate until device ready	250 mSec	50 mSec
Init time from hibernate until WPA2 connection	300 mSec	95 mSec
Maximum UDP throughput, open socket	13 Mbps	16 Mbps
Maximum TCP throughput, open socket	11 Mbps	12 Mbps
Maximum TLS/SSL throughput with RC4_128 cipher	5 Mbps	8 Mbps
Maximum TLS/SSL throughput with AES_256 cipher	7 Mbps	8 Mbps
Minimum TLS/SLL connection time with ECC cipher	2.5 Sec	1.4 Sec
Minimum TLS/SSL connection time with RSA cipher	200 mSec	150 mSec

** SDK 1.0.0 target performance based on CC3100 production device

9.3 Wi-Fi known issues

ID	MCS00130040
Title	Wi-Fi Direct connection can fail at first attempt
Description	Negotiation with peer device is not always successful at first attempt
Impact	The first connection doesn't success
Workaround	Repeat the connection attempt
Fix Expected	Will be improved in SDK 1.0.0

ID	MCS00130160
Title	Scan during connection process
Description	Cannot invoke a scan command while trying to connect
Impact	Scan command might interfere with connection process
Workaround	Avoid calling scan during connection
Fix Expected	Fix expected in SDK 1.0.0

ID	MCS00130368
Title	Adding profile using Fast connection-policy
Description	The profile has to be explicitly added when using 'Fast' connection-policy
Impact	Connection policy with 'Fast' will not connect automatically if profile is not added explicitly.
Workaround	Add the profile manually
Fix Expected	Fix expected in SDK 1.0.0

9.4 Networking known issues

ID	MCS00127876
Title	sl_NetAppDnsGetHostByName returns with no answer
Description	In high Rx traffic conditions some DNS packets can be dropped, causing GetHostByName to fail
Impact	No answer on request
Workaround	Upon error return status call the API again

ID	MCS00128959
Title	Failing IXIA invalid DHCP test case
Description	Failing IXIA test case for RFC2131
Impact	Device IP address will not be updated when receiving a malformed DHCPACK packet

ID	MCS00129407
Title	Failing IXIA malformed ICMP header test case
Description	Failing IXIA test case 5.1 for handling malformed ICMP header
Impact	None

9.5 Host driver known issues

ID	MCS00130291
Title	WPS PIN Connect failure if pin code is not null-terminated
Description	If the PIN code from the HOST is not null terminated connection can fail in some cases
Impact	Connection failure
Workaround	Add null termination to the PIN code string

9.6 Applications known issues

ID	MCS00130240
Title	In AP mode the internal DNS Server cannot be disabled
Impact	Cannot use external DNS server in AP mode

ID	MCS00130241
Title	'AnyP2P' and 'Auto smart config' policies can be changed only in station or P2P mode
Impact	Can't change these specific configurations from the HTTP server in AP mode
Workaround	Change the configurations while in STA mode

ID	MCS00130114
Title	HTTP Server: cannot add Enterprise or P2P profile from HTTP Server
Description	Adding enterprise or P2P profile is not possible from HTTP pages
Impact	Can't add enterprise or P2P profiles from HTTP pages
Workaround	Add the specific profiles from MCU
Fix Expected	Fix expected in SDK 1.0.0