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

Software Development Kit (SDK) v1.0.0 Release Notes

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1   Introduction

This document describes the Software Development Kit (SDK) version 1.0.0 for use with the CC3100 SimpleLink Wi-Fi Network Processor device mounted on the CC3100 BoosterPack development platform.

The same SDK is also applicable to Pre-production devices. Errata section of the document describes the minor performance limitations of Pre-Production Devices.

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.

2.1   Procedure to Upgrade from SDKv0.5.2 to SDK1.0

To upgrade from SDKv0.5.2 to SDK1.0, servicepack "servicepack_1.0.0.1.0" needs to be flashed on CC3100. The Service pack "servicepack_1.0.0.1.0" is provided thru CC31xx_CC32xx_ServicePack-1.0.0.1-windows-installer.exe downloadable from http://www.ti.com/tool/cc3200sdk. Please refer to UNIFLASH Quick start guide on details of flashing (http://processors.wiki.ti.com/index.php/CC31xx_%26_CC32xx_UniFlash) the service pack

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3 Release Content

Item	Version	Type
Device	CC3100R11MRGC XCC3100HZ	Production device Pre-production Devices
Development boards	CC3100BOOST Rev3.3 onwards with CC31XXEMUBOOST Board Rev3.0	Orderable from TI
SDK Installer	CC3100SDK-1.0.0-windows-installer.exe For Windows 7 and Windows XP	Provided with a click wrap license
Firmware	2.1.0.12.31.1.1.0.5.1.0.3.20 (Production Device) 2.0.7.12.31.0.0.4.5.1.5.3.20 (Pre-Production Device)	Servicepack_1.0.0.1.0 is provided thru ServicePack CC31xx_CC32xx_ServicePack-1.0.0.1-windows-installer.exe downloadable from http://www.ti.com/tool/cc3200sdk
Reference host platform	MSP430F5529 Launch Pad MSP430FRAM5739 Experimenter Board Rev 1.1 MSP430F5529 Experimenter Board MSP430FR5969 Launchpad TM4C123GH6PM Launchpad	Orderable from TI
Network Processor Host driver	Version 1.0.0.1	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	Executable

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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 o CCS projects for all sample applications o IAR projects for getting started applications o Drivers o Simplelink Host Driver Platform Configuration file (user.h) • MSP430FR5529, TM4C123GH6PM, MSP430FR5739, MSP430FR5969 o CCS and IAR projects for getting started applications o Drivers o Simplelink Host Driver Platform Configuration file (user.h) • simplelinkstudio: o Visual-Studio Express and Eclipse projects for sample applications o 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

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5 Networking features

5.1 Wi-Fi

Standards	802.11b/g/n (20MHz SISO) **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 SSL_RSA_WITH_RC4_128_SHA SSLV3 SSL_RSA_WITH_RC4_128_MD5 TLSV1 TLS_RSA_WITH_RC4_128_SHA TLSV1 TLS_RSA_WITH_RC4_128_MD5 TLSV1 TLS_RSA_WITH_AES_256_CBC_SHA TLSV1 TLS_DHE_RSA_WITH_AES_256_CBC_SHA TLSV1 TLS_ECDHE_RSA_WITH_RC4_128_SHA TLSV1 TLS_ECDHE_RSA_WITH_AES_256_CBC_SHA TLSV1_1 TLS_RSA_WITH_RC4_128_SHA TLSV1_1 TLS_RSA_WITH_RC4_128_MD5 TLSV1_1 TLS_RSA_WITH_AES_256_CBC_SHA TLSV1_1 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
    - o Supports Little Endianness
    - o Supports Big Endianness auto detection for SPI interface
    - o 8/16/32 bit modes are supported
- TCP/IP
    - o TCP Window size is 16KB, divided between application sockets.
    - o IP Fragmentation is not supported for Tx UDP and RAW sockets
    - o Max Tx payload for Raw packet with IP header is 1460 bytes
    - o Max Tx payload for Raw Transceiver is 1488 bytes
- SSL/TLS Certificates
    - o Certificate Authority (CA) certificates needs to be installed if server authentication is required
    - o CA Certificate key size up to 2048 bit
- WEP
    - o Supporting only WEP open using ASCII pre shared key however a small code can be used to support Hex format (more details and code example included in the programmer's guide)
- WPS
    - o Up to 4 seconds delay between association and EAPOL-Start
- SmartConfig
    - o Not supported with 5GHz AP (802.11a/n/ac)
    - o Not supported for MIMO-capable configuration devices
    - o Only Group 0 is supported in auto start mode
- Tx Power
    - o Tx power in AP mode takes effect only after reset
- Wi-Fi Direct
    - o In Group Owner mode FAST connection policy has to be set to TRUE
- Rx Filters
    - o BSSID can't be filtered while STA is connected (if filtered will cause disconnection)
- Power Management
    - o The device will remain in active after initialization until the host reads all events
- Host
    - o The Host driver is assuming that a Char value is equal to 1 Byte. MCU (like CC2000) that support different configuration won't work with the Host Driver as is. The only option is to port the driver manually to the MCU architecture
- File System
    - o 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:

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- o Micron   N25Q128-A13BSE40   128Mbit
- o Spansion   S25FL208K   8Mbit
- o Winbond   W25Q16V   16Mbit
- o Adesto   AT25DF081A   8Mbit
- o 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, MSP430FR5969, TM4C123GH6PM and SimpleLink Studio on a PC environment. All the applications can be easily ported to other MCUs and host processors. The default speed of SPI clock is 12 MHz and can be increased to 20 MHz.

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

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8   Revision History

SDK Version	Updates from previous version
1.0.0	• Adder support for MSP430FR5969 platform • Removing filters while configuring the device to default state • Added error handling in all the applications. • Moved AP and time configuration macro and networking status bit enum to common header file "sl_common.h" • Updated the "file_download" example to remove the use of temporary file • Modified uniflash session files to use the relative paths • Enabled automatic FTDI driver installation capability • Enabled FTDI driver support on 32 bit windows machine • Increased the SPI clock for all MCU platform
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   Issues resolved in sample applications

ID	8400
Title	SLS applications doesn't accept the SSID with space
Description	SLS application doesn't connect to an AP having SSID with space
Workaround	N/A
Fix Expected	Resolved

ID	8410
Title	SLS_Sniffer_with_filter application can't successfully create frame subtype filter
Description	Frame subtype filter should have frame type filter as parent.

Workaround	N/A
Fix Expected	Resolved

10 Errata

The following section covers known issues and performance limitations with CC3100 pre-production devices.

10.1 Hardware

10.1.1 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.

10.1.2 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

10.2 Performance

Item	Pre-Production device	Production device
Maximum SPI clock speed	14 MHz	20 MHz
Init time from hibernate until device ready	250 mSec	75 mSec
Init time from hibernate until WPA2 connection	300 mSec	120 mSec
Maximum UDP throughput, open socket	13 Mbps	16 Mbps
Maximum TCP throughput, open socket	11 Mbps	13 Mbps
Maximum TLS/SSL throughput with RC4_128 cipher	5 Mbps	9 Mbps
Maximum TLS/SSL throughput with AES_256 cipher	7 Mbps	12 Mbps
Minimum TLS/SLL connection time with ECC cipher	2.5 Sec	1.3 Sec

Minimum TLS/SSL connection time with RSA cipher	200 mSec	130 mSec

10.3 Firmware issues fixed in this release

ID	MCS00130114
Title	HTTP Server: cannot add Enterprise or P2P profile from HTTP Server

ID	MCS00130368
Title	Adding profile using Fast connection-policy
Description	The profile has to be explicitly added when using 'Fast' connection-policy

ID	MCS00130160
Title	Scan during connection process
Description	Cannot invoke a scan command while trying to connect

ID	MCS00130886
Title	DHCP client: DNS address is 0
Description	When the DHCP server return more than 2 DNS address, the DNS address is 0

ID	MCS00130847
Title	"Auto Smart Config" and "Any Wifi Direct" changes are not kept despite configuration change

10.4 Wi-Fi known issues

ID	MCS00130040
Title	WiFi Direct Reliability: 65% Success rate when Peer device is initiator of connection
Description	Negotiation with peer device is not always successful at first attempt
Impact	The first connection doesn't success
Workaround	Try to connect again
Fix Expected	Next Revision

ID	MCS00123349
Title	WiFi Security: CC31xx Supports only WEP with Key Index 0 (==> AP Key index 1)
Description	When using WEP security – only WEP index 0 is supported
Impact	Can't use more than one key in WEP security
Workaround	None
Fix Expected	TBD

10.5 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	Run the API again
Fix Expected	TBD

ID	MCS00128959
Title	DHCP: SL continues using its previous IP address if an invalid IP in the DHCPACK (before lease time expired)
Description	DHCPACK arrives to SL with invalid address in the DHCPACK params address field but also the IP destination is the same invalid address (MAC address is the valid SL address). SL does not listen to other IPs address as destination but his own therefore this DHCPACK is not processed and SL continue to use his old address until the lease time expires
Impact	The device will continue to use the previous IP address
Workaround	N/A
Fix Expected	Not expected

ID	MCS00128353
Title	UDP/RAW socket data payload is limited to MTU size
Description	Tx IP Fragmentation is not supported for UDP and RAW Tx
Impact	Packet bigger than MTU size will lead that portion of the packet will be discard
Workaround	Use packet size <= MTU size
Fix Expected	TBD

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ID	MCS00129407
Title	NS: SL device should discard datagram with problem in IP Header
Description	If the gateway or host processing a datagram finds a problem with the header parameters such that it cannot complete processing the datagram it must discard the datagram
Impact	Low impact – The SL device sends ICMP reply message
Workaround	N/A
Fix Expected	TBD

10.6   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 doesn't succeed
Workaround	Add null termination to the PIN code string
Fix Expected	TBD

10.7   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
Workaround	N/A
Fix Expected	TBD

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
Fix Expected	TBD

11 Host Driver Changes from SDK 0.5.2 release

All the APIs are documented with the HTML programmers guide.

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11.1 Defines and Structures

0.5.2 Release	1.0.0.1 Release	Action
_NetCfgIpV4Args_t	SlNetCfgIpV4Args_t	Changed
SL_WLAN_SMART_CONFIG_START_EVENT	SL_WLAN_SMART_CONFIG_COMPLETE_EVENT	Changed
SL_NETAPP_HTTPGETTOKENVALUE	SL_NETAPP_HTTPGETTOKENVALUE_EVENT	Changed
SL_NETAPP_IPACQUIRED_EVENT	SL_NETAPP_IPV4_IPACQUIRED_EVENT	Changed
SL_NETAPP_HTTPPOSTTOKENVALUE	SL_NETAPP_HTTPPOSTTOKENVALUE_EVENT	Changed
SL_NETAPP_IP_LEASED	SL_NETAPP_IP_LEASED_EVENT	Changed
SL_NETAPP_IP_RELEASED	SL_NETAPP_IP_RELEASED_EVENT	Changed

11.2 File change

File	Action
Datatypes.h	Removed

11.3 Data Types changes

Data Types	Action
native and special (UINT8,UINT16,UINT32,INT8,INT16,INT32	Changed to _u8,_u16,u32, _i8,_i16,_i132

11.4 Additional changes

- Fixed warnings for mspgcc and Keil
- Added sl_DeviceEnablePreamble() to User.h