

# Arrayent DevKit Sample Application Quick Start Guide For TI CC3220

28 March 2017

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# **Chapter 1. Overview**

This document will guide you in getting started with the Arrayent DevKit Sample application (now on referred as sample application) on TI CC3220 Launch Pad hardware platforms:

In this guide, you will learn how to:

- 1. Load and run the pre-built binary of the sample application onto your development board.
- 2. Add the sample application source code, Arrayent Connect Agent (ACA) library and support library to your platform SDK.
- 3. Build and load sample application onto your development board.
- 4. Control and Monitor your development board over the Internet, by either using Arrayent web apps or Arrayent's "DevKit" android application.

# 1. Audience and Scope

This document is split into three major sections: setting up the sample application, configuring the Arrayent Connect Cloud (ACC) and monitoring/controlling the development board using Arrayent's web application.

The sections of this document that pertain to building and loading the sample application onto a development board are primarily intended for embedded developers. For these sections we assume that you are familiar with your embedded platform's SDK. You should be able to build and execute the other sample applications in your embedded SDK before attempting to use the Arrayent sample application.

A pre-built binary of the sample application is provided with the DevKit release package for anyone who wants to see the live demo of the development board connecting to the internet. Once the development board has been loaded with the sample application, the workflow for configuring the sample application, cloud and monitoring/controlling the board with a web app is simple and straightforward. This part of the guide is simple to follow for anyone.

# 2. Prerequisites

In this guide we assume that you signed up for a DevKit via our online form and received an email containing user account credentials, device credentials, web application URLs, and links for software downloads. If you received your DevKit in a different manner you may need to contact your Arrayent support person for some help.

To build and download the sample application to your development board you will need to use command line utilities. We assume familiarity with basic DOS commands like cd, dir, etc.

# 3. Supported Software and Hardware Platforms

The sample application was tested with the following combination of operating system, platform SDK and development board. The sample application and/or Arrayent library may work with other versions of evaluation board, module, or SDK. But Arrayent cannot guarantee or verify this. Arrayent only supports the combination of hardware and software mentioned below:

#### TI CC3220 Launchpad:

#### **Operating System**

• Windows 8.1

#### CCS

• Version 7.0

#### Simplelink CC3220 SDK

- SDK Version: 1.02.02.00
- Download TI CC3220 SDK installer from below link:
  - TBD

#### **TI Launchpad**

• Development Board: CC3220-LaunchXL Rev-B: Board version is located on the front side of the board as shown in the below figure.

#### Uniflash

• Version: 4.0



# Figure 1: TI Launchpad Front

# Chapter 2. Note on DevKit Credentials and Environment

At various times in this guide, we will refer to "device credentials" and "user account credentials".

Arrayent distributes this information in various ways depending upon the context of our engagement with you, so please read the section below that applies to you so that you know where to get this information.

# 1. Users Who Receive Explicit Credentials from Arrayent

If you have received explicit instructions from Arrayent that lists out your user and device credentials, then you should use those values whenever this guide prompts you for that information. We typically distribute this information in a dedicated document, with a title like "DevKit Account Information", or you may have received it via an automated email after filling out a form.

# **Chapter 3. Sample application Setup**

In this section you will learn how to:

- Load the pre-built binary of the sample application
- Setup the SDK, build and load the sample application source code
- Setup WiFi router credentials and ACA configuration

# 1. Release package Directory Structure

Following is the release package directory structure for all platforms:



0

- app sample application and related libraries.
  - app -> bin Sample application binary
    - app -> src Sample application and related libraries.
      - app -> src -> devkit\_app Sample application source code.
      - app -> src -> ama Arrayent multi-attribute helper module
      - app -> src -> asp Arrayent application support package provides abstraction over different platforms
- library->arrayent ACA library

# 2. Steps to load the pre-built devkit application image

#### TI CC3220 Launchpad:

- a. Connect the board to the computer using mini USB cable. Wait a minute to let the device drivers install.
- b. If you click on the Installing device driver software popup, you can see the status of the device driver installation.
- c. Follow the steps below to flash the application and store web pages into flash using uniflash:
  - i. Open UniFlash 4.0
  - ii. Select "CC3120/CC3220" device from "Enter Device Name" bar.

5		UniFlash		- 🗆 🗙
UniFlash	Session 👻 About			
🝷 New Configu	uration			
		Choose Your Device		
		Category: All   C2000   MSP   Safety   Tiva   Wire	less   UCD	
		<b>Q</b> Enter Device Name (1217 Available)	×	
		TMS570LS2134	*	
1		TMS570LS2135		
		TMS570LS3134		
		TMS5/0LS3135		
		UCD3138		
		UCD31380644		
		UCD3138128		
		UCD3138128A		
		UCD3138A		
		UCD3138A64		
		CC3120 / CC3220	-	
		2 Choose Your Connection		
		3 Start		
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Verify "Serial (UART) Interface" is selected as a connection.

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UniFlash	Session + About	
- New Cont	Ifiguration	
	Selected Device:	~ X
	Selected Connection: 🍟 Serial (UART) Interface	
	3 Start Image Creator	
✓ Create Se	ession From Existing Target Configuration File	
	Select a .ccxml file to create a new session.	

iv. Click on "Start Image Creator" button

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<b>UniFlash</b> Session <del>-</del> About										
✓ New Configuration										
	Selected Device:	~ X								
Selected Connection: 🗑 Serial (UART) Interface										
3 Start Image Creator										
✓ Create Session From Existing Target C	Sonfiguration File									
	Select a .ccxml file to create a new session.									
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UniFlash										
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	WI-FI® Image Creator									
	,									
	Manage Projects         Program Image           Open/Import/Export/Rename/Delete         Program image from an image file									
	Recent Projects									
	New Project									
	Start a blank project with new settings									
	Version: 1.0.17.5 All rights reserved to Texas Instruments inc (c) - For more information go to our <b>Help Pages</b>									

devkit\_app\_Programming.sli file located at "<PATH TO DEVKIT APP BUNDLE>\app\bin"

#### Arrayent DevKit Sample Application Quick Start Guide for TI CC3220

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UniFlash		
🐺 Texas Instruments	Program Image	
		Device status
General -	Image File Name	
E Settings	Browse	
Radio Settings		
Role Settings	Image Key File Name	Connect
🖯 General Settings	Browse	
STA/Wi-Fi® Direct Device		
Network Settings		-
WI AN Settings		<i>₽</i>
Network Settings	<< Back Program Image	
Network Applications		
Files		
User Files		
Service Pack		
Trusted Root-Certificate Catalog	Version: 1.0.17.5 All rights reserved to Texas Instruments inc (c) - For more information go to our <b>Help Pages</b>	

vii. Click on "Program Image" button

5	SimpleLink™ Image Creator	- = ×
UniFlash		
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Files User Files Service Pack Trusted Root-Certificate Catalog	Version: 1.0.17.5 All rights reserved to Texas Instruments inc (c) - For more information go to our <mark>Help Pages</mark>	

viii. On successful completion, It prints "Programming complete" message

6	SimpleLink™ Image Creator	- 🗆 🗙
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ix. Reset the development board by pressing RESET push button. Demo application will be running once the board is rebooted. You may now try out the internet connectivity by skipping to section 4.

### 3. Setup development environment

Use this section if you want to try modifying the sample application. You may skip this section and continue on section 4 if you simply want to try out the pre-packaged sample application.

#### TI CC3220 Launchpad:

- a. Follow steps a-b of the previous section to install the drivers for the TI CC3220 development board.
- b. Please follow

"C:/TI/simplelink\_cc32xx\_sdk\_1\_02\_02\_00/docs/simplelink\_mcu\_sdk/Quick\_Start\_G uide.html" document to build sdk and setup CCS for TI CC3220 development.

- c. Copy the "<*PATH TO DEVKIT APP BUNDLE*>\library\arrayent" folder to <*PATH TO TI SDK*>\library directory. If you have the debug version of the libaca package, rename the library from libaca\_ti\_debug.lib to libaca\_ti.lib.
- d. Open CCS v7.0
- e. Select "Project->Import CCS Projects.." in CCS IDE.

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f. Click on Browse button and select "C:\TI\simplelink\_cc32xx\_sdk\_1\_02\_02\_00\kernel\tirtos\builds\CC3220SF\_LAUNCH XL\release\ccs" folder.

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g. Click on Finish button to complete Import process.

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j. Click on Browse button and select "<*PATH TO DEVKIT APP BUNDLE*>\app\src\devkit\_app\cc3220\CCS" folder.

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m. Click on "Manage Configuration" button to select project configuration

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	Runtime supp	port library:	<automatic></automatic>		✓ Browse
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n. Select "Debug" or "Release" configuration and click on "Set Active" button and click on OK button to save configuration.

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o. Select Build in left side of properties window. Select Dependencies tab and click on Add button.

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p. Select "tirtos\_builds\_CC3220SF\_LAUNCHXL\_release\_ccs" project and click on OK button.

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<ul> <li>type filter text</li> <li>Resource General</li> <li>Build</li> <li>ARM Compiler Processor Options Optimization Include Options ULP Advisor Predefined Symbols</li> <li>Advanced Options</li> <li>Advanced Options</li> <li>ARM Linker</li> <li>ARM Hex Utility Debug Git</li> </ul>	Properties for de Build Configuration: Debug [Active] Builder  Builder  Behaviour  Step Referenced Project Continue Step Intros_builds_CC3220SF_LAUNC.	s S Variables Enviror Referenced Build-configura Release <active> Debug Release</active>	✓ Manage  mment	Creenshot:
<ul> <li>type filter text</li> <li>Resource General</li> <li>Build         <ul> <li>ARM Compiler Processor Options Optimization Include Options ULP Advisor Predefined Symbols</li> <li>Advanced Options</li> <li>Advanced Options</li> <li>ARM Linker</li> <li>ARM Hex Utility Debug Git</li> </ul> </li> </ul>	Properties for de Build	s S Variables Enviror Referenced Build-configura Release <active> Debug Release</active>	✓ Manage  mment ↔ Link Order	Creenshot:
<ul> <li>type filter text</li> <li>Resource General</li> <li>Build</li> <li>ARM Compiler Processor Options Optimization Include Options ULP Advisor Predefined Symbols</li> <li>Advanced Options</li> <li>ARM Linker</li> <li>ARM Hex Utility Debug Git</li> </ul>	Properties for d Build Configuration: Debug [Active] Builder  Builder  Behaviour  Step Referenced Project Configuration: Configuration and a step Referenced Project	s Variables S Enviror Referenced Build-configura Release <active> Debug Release</active>	v Manage nment ↔ Link Order • tion	Creenshot:
<ul> <li>type filter text</li> <li>Resource</li> <li>General</li> <li>Build</li> <li>ARM Compiler</li> <li>Processor Options</li> <li>Optimization</li> <li>Include Options</li> <li>ULP Advisor</li> <li>Predefined Symbols</li> <li>Advanced Options</li> <li>ARM Linker</li> <li>ARM Hex Utility</li> <li>Debug</li> <li>Git</li> </ul>	Properties for d Build Configuration: Debug [Active] Builder  Builder  Behaviour  Step Referenced Project Configuration: CC3220SF_LAUNC	s S Variables S Enviror Referenced Build-configura Release <active> Debug Release</active>	v Manage	Creenshot:
<ul> <li>type filter text</li> <li>Resource</li> <li>General</li> <li>Build</li> <li>ARM Compiler</li> <li>Processor Options</li> <li>Optimization</li> <li>Include Options</li> <li>ULP Advisor</li> <li>Predefined Symbols</li> <li>Advanced Options</li> <li>ARM Linker</li> <li>ARM Hex Utility</li> <li>Debug</li> <li>Git</li> </ul>	Properties for de Build	s S Variables Enviror Referenced Build-configura Release <active> Debug Release</active>	✓ Manage  ment	Creenshot:
<ul> <li>type filter text</li> <li>Resource General</li> <li>Build         <ul> <li>ARM Compiler Processor Options Optimization Include Options ULP Advisor Predefined Symbols</li> <li>Advanced Options</li> <li>Advanced Options</li> <li>ARM Linker</li> <li>ARM Hex Utility Debug Git</li> </ul> </li> </ul>	Properties for de Build Configuration: Debug [Active] Builder  Builder  Builder  Builder  Builder  Builder  Builder  Builder  See 'General' for changing tool versions	s S Variables Enviror Referenced Build-configura Release <active> Debug Release</active>	✓ Manage  ment ↔ Link Order     tion	Creenshot:
type filter text          kesource         General         Build         ARM Compiler         Processor Options         Optimization         Include Options         ULP Advisor         Predefined Symbols         ARM Linker         ARM Hex Utility         Debug         Git	Properties for d Build Configuration: Debug [Active] Builder  Builder  B	s S Variables S Enviror Referenced Build-configura Release <active> Debug Release</active>	✓ Manage	Creenshot:

- r. Click on OK button to save the properties of devkit\_app project.
- s. Right click on "devkit\_app" project in Project Explorer window and select "Build Project" to build Devkit application.



t. On successful devkit application build "Build Finished" message should appear in Console.



# 4. Create Image Using UniFlash

- a. Open on Uniflash v4.0
- b. Select "CC3120/CC3220" device from "Enter Device Name" bar.

<u>11</u>	UniFlash	
UniFlash Session - About		
<ul> <li>New Configuration</li> </ul>		
	1 Choose Your Device	
	Category: All   C2000   MSP   Safety   Tiva   Wirel	less   UCD
	<b>Q</b> Enter Device Name (1217 Available)	×
	TMS570LS2134	<b>^</b>
	TMS570LS2135	
	TMS570LS3134	
	TMS570LS3135	
	TMS570LS3137	
	UCD3138	
	UCD3138064	
	UCD3138064A	
	UCD3138128	
	UCD3138128A	
	CC3138A64	
	6631207 663220	Y
	Choose Your Connection	
	3 Start	
	3 Start	

c. Verify "Serial (UART) Interface" is selected as a connection.

UniFlash Session - About	
✓ New Configuration	
Selected Device:	~ ×
🧭 Selected Connection: 🗑 Serial (UART) Interface	
3 Start Image Creator	
▼ Create Session From Existing Target Configuration File	
Select a .ccxml file to create a new session.	

d. Click on "Start Image Creator" button

X

5		UniFlash	– 🗆 ×
UniFlash	Session 👻	About	
👻 New Conf	figuration		
		Selected Device:	~ ×
		🧭 Selected Connection: 🍟 Serial (UART) Interface	
		3 Start Image Creator	
🝷 Create Se	ssion From E	xisting Target Configuration File	
		Select a .ccxml file to create a new session.	

e. Click on "New Project" button to create new project.

8	SimpleLink™ Image Creator – □ ×			
UniFlash				
🔱 Texas Instruments	Welcome to SimpleLink™ Wi-Fi® Image Creator Create & program Images to your CC31xx/CC32xx devices easily			
	Manage Projects       Program Image         Open/Import/Export/Rename/Delete       Program image from an image file         Recent Projects			
	Version: 1.0.17.5			

f. Enter project name as "devkit\_app" and select device type as "CC3220SF" and device mode as "Production". Click on "Create Project" button to create project

Start new project	
Project Name	
devkit_app	
Project Description	
Device Type	
CC3220SF •	
Device Mode	
Production	
<< Back	Create Project
Version: 1.0.17.5	

g. Click on connect button to Connect to device.

	SimpleLink™ Im	age Creator	
niFlash			
🜵 Texas Instruments	General	Service Pack	ertificate 🛛 🛛 Help
General - devkit_app ⊖ Settings	General Summary	devklt_app	▼▲
System Setting  Device Radio Settings Role Settings	Mode Device Type	production CC3220SF Connect	3
General Settings STA/WI-FI® Direct Device Network Settings Network Settings	Capacity	4M Byte	9
WLAN Settings Network Settings		2	
Files User Files Service Pack			
Trusted Root-Certificate Catalog	Version: 1.0.17.5 All rights reserved to Texas Instruments inc (c) - For $\ensuremath{m}$	ore information go to our Help Pages	

h. Check if Connection status in On and Device Type as "CC3220SF, Secure". If device is not secured then skip certificate related steps.

6	SimpleLink™ Image Creator	- • ×
UniFlash		
🔱 Texas Instruments	General	Service Pack   Certificate Help
General - devkit_app Settings System Settings Device Call Radio Settings Call Role Settings Call Settings	General Summary         Name       devkit_app         Mode       production         Device Type       CC3220SF         Capacity       4M Byte	Device status         Connected: On         Device Type: CC3220SF, Secure         MAC Address: 04:a3:16:45:94:31         HW Version: 48         Programming Status: On         Current Mode: Development         Storage Capacity: 4096K8         Formatted Capacity: 4096K8         SFLASH codes: 0xc2,0x28,0x16         Security Alerts: 0 / 15

i. Select "Trusted Root Certificate Catalog" under "Files" section

5	SimpleLink™ Image Creator	- 🗆 🗙
UniFlash		
🔱 Texas Instruments	Files > Trusted Root-Certificate Catalog	Service Pack Certificate Help
General - devkit_app Settings System Setting Device Radio Settings Role Settings General Settings STA/Wrif@ Direct Device Network Settings AP/Wrifi@ Direct GO WLAN Settings Network Settings Network Settings Network Settings Network Applications Files	Trusted Root-Certificate Catalog         Image: Source File         /files/certstore.lst         Browse         /files/certstore.lst.gned	Device status         %       Connected: On          Device Type: CC3220SF, Secure          MAC Address: 04:a3:16:45:94:31          HW Version: 48          Programming Status: On          Current Mode: Development         Storage Capacity: 4096KB          Formatted Capacity: 4096KB          SFLASH codes: 0xc2,0x28,0x16          SFLASH codes: 0xc2,0x16          Security Alerts: 0 / 15
Service Pack Trusted Root-Certificate Catalog		
	Version: 1.0.17.5 All rights reserved to Texas Instruments inc ( $c$ ) - For more information go to our Help Pages	×

#### j. Uncheck"Use default Trusted Root Certificate Catalog" option

6	SimpleLink™ Image Creator - □ ×			
UniFlash				
👋 Texas Instruments	Files > Trusted Root-Certificate Catalog	Service Pack Certificate Help		
General - devkit_app Settings System Settings Pervice Radio Settings Role Settings General Settings STA/Wi-Fi® Direct Device Metwork Settings AP/Wi-Fi® Direct GO WLAN Settings Network Settings Case of the Settings	Trusted Root-Certificate Catalog         Use default Trusted Root-Certificate Catalog         Source File         Browse	Device status            • Connected: On             • Device Type: CC3220SF, Secure             • MAC Address: 04:a3:16:45:94:31             • MAC Address: 04:a3:16:45:94:31             • HW Version: 48             • Programming Status: On             • Current Mode: Development             • Storage Capacity: 4096KB             • Formatted Capacity: 4096KB             • SFLASH codes: 0xc2,0x28,0x16             • Security Alerts: 0 / 15		
	Version: 1.0.17.5 All rights reserved to Texas Instruments inc (c) - For more information go to our <b>Help Pages</b>	₽ 2 2		

k. Browse "Source File" to

"C:\TI\simplelink\_cc32xx\_sdk\_1\_02\_02\_00\tools\cc32xx\_tools\certificateplayground\certcatalogPlayGround20160911.lst" file and "Signature Source File" to "C:\TI\simplelink\_cc32xx\_sdk\_1\_02\_02\_00\tools\cc32xx\_tools\certificateplayground\certcatalogPlayGround20160911.lst.signed.bin" file.

	SimpleLink <sup>™</sup> Image Creator	
JniFlash		
	Files > Trusted Root-Certificate Catalog	Service Pack Certificate Help
General - devkit_app Settings System Setting Device Radio Settings General Settings STA/Wi-Fi® Direct Device Network Settings	Trusted Root-Certificate Catalog         Use default Trusted Root-Certificate Catalog         Source File         certcatalogPlayGround20160911.1         Browse         Signature Source File	Device status       Image: Statu
WLAN Settings WLAN Settings Network Applications Files User Files Service Pack Trusted Root-Certificate Catalog	certcatalogPlayGround20160911.] Browse	SFLASH codes: 0xc2,0x28,0x16 SFLASH codes: 0 / 15 Disconnect
	Version: 1.0.17.5 All rights reserved to Texas Instruments inc (c) - For more information go to our <b>Help Pages</b>	

#### I. Select "Service Pack" under "Files" section

SimpleLink <sup>®</sup> image Creator	
Files > Service Pack	Service Pack Certificate O Help
Service Pack File Name Browse Clear Clear Version: 10.17.5 All rights reserved to Texas Instruments inc (c) - For more information go to our Help Pages	Device status         Connected: On         Mac Address: (J4:a3:16:45:94:31)         HW Version: 48         Programming Status: On         Current Mode: Development         Storage Capacity: 4096K8         Formatted Capacity: 4096K8         SFLASH codes: 0xc2,0x28,0x16         Security Alerts: 0 / 15
	Files > Service Pack         Service Pack File Name         @rowse       Clear         Clear         Version: 1.0.7.5         All rights reserved to Texas Instruments inc (c) - For more information go to our Help Pages

m. Browse "Service Pack Flle Name" to "C:\TI\simplelink\_cc32xx\_sdk\_1\_02\_02\_00\tools\cc32xx\_tools\servicepackcc3x20\sp\_3.2.0.0\_2.0.0.0\_2.2.0.4.bin".

6	SimpleLink™ Image Creator	- 🗆 🗙
UniFlash		
🜵 Texas Instruments	Files > Service Pack	Service Pack Certificate Help
General - devkit_app Settings System Setting Bevice Radio Settings General Settings STA/Wi-Fi® Direct Device Network Settings AP/Wi-Fi® Direct GO WLAN Settings Network Settings Stark Applications Files User Files Service Pack	Service Pack File Name         sp_3.2.00_2.0.0.0_2.2.0.4.bin         Browse       Clear	Device status         Image: Connected: On         Image: Device Type: CC3220SF, Secure         Image: Omega:
Trusted Root-Certificate Catalog	Version: 1.0.17.5	Disconnect

n. Select "User Files" under "Files" section

6	SimpleLink™ Image Creator	- • ×
UniFlash		
\psi Texas Instruments	Files > User Files	Service Pack Certificate Help
		Device status
General - devkit_app	Check All   Uncheck All Action: Select Action Execute	% Connected: On
Settings	File Properties	Device Type: CC2220SE Secure
System Setting		MAC Address: 04:s2:16:45:04:21
Device		MAC Address: 04:85:10:45:94:51
Radio Settings		(b) Desperatories Status: On
□ Role Settings		v> Programming Status: On
General Settings		Current Mode: Development
STA/WI-FI® Direct Device		Storage Capacity: 4096KB
AP/Wi-Fi® Direct GO		Formatted Capacity: 4096KB
WLAN Settings		Available for User Files: 2544KB
Network Settings		SFLASH codes: 0xc2,0x28,0x16
Network Applications		Security Alerts: 0 / 15
Files	· ·	
User Files	, ,	
Service Pack		
Trusted Root-Certificate Catalog		Disconnect
		C
	Version: 1.U.17.5 All rights reserved to Texas Instruments inc (c) - For more information go to our Help Pages	· · · · · · · · · · · · · · · · · · ·

o. Click on add file icon as shown in below screenshot

6	SimpleLink™ Image Creator	- 🗆 🗙
UniFlash		
🐺 Texas Instruments	Files > User Files	Service Pack © Certificate © Help
General - devkit_app System Settings Device Aldo Settings General Settings General Settings STA/Wi-Fi® Direct Device Network Settings AP/Wi-Fi® Direct GO WLAN Settings Network Settings Network Settings Service Pack Trusted Root-Certificate Catalog	Check All   Uncheck All Action: Select Action	Device status         Image: Connected: On         Image: Device Type: CC3220SF, Secure         Image: MAC Address: 04:a3:16:45:94:31         Image: HW Version: 48         Image: Programming Status: On         Image: Connected: Device Type: CC3220SF, Secure         Image: Connected: Device Type: CC3220SF, Secure         Image: CC3220SF, Secure     <
	Version: 1.0.17.5 All rights reserved to Texas Instruments inc (c) - For more information go to our Help Pages	<u>~</u>

p. Browse to "C:\TI\simplelink\_cc32xx\_sdk\_1\_02\_02\_00\tools\cc32xx\_tools\certificateplayground\dummy-root-ca-cert" to add file. After selection file configuration window will appear as shown in below screenshot.

5		SimpleLink <sup>™</sup> Image Creator		- 🗆 🗙
UniFlash				
TEXAS INSTRUMENTS	Eilos > Us	eor Eilae	C Participat	ertificate Ø Help
	Filo Nomo:		Max File Size: (actual size: 975)	
dumm	nie Name.		075	
General - devkit_ap	ly-loot-ca-cen		915	
E Settings	Isafe	Vendor		20SF. Secure
System Setting	cure	Public Write		3:16:45:94:31
Radio Sett	Signature Test	Public Read		
Role Settings				us: On
General Se File To	ken:			elopment
🗆 STA/Wi-Fi				1096KB
Netw				ACCOUNT OF
	rivate Key File Name:	•		iles: 2544KB
Netw				c2.0x28,0x16
Network Applic		Browse Clear		15
Files				
User Files	ation File Manag			
Service Pack Certific	auon rile Name.			_
Trusted Root-G		· _		≥
Write	Cancel			_
			lo Pages	

q. Select "Failsafe" option and click on Write button to add File to project.

SimpleLink image Creator	
UniFlash	
TEXAS INSTRUMENTS	rtificate 🛛 Help
File Name: Max File Size: (actual size: 975)	
General - devkit_ap	
Settings     ✓ Failsafe     Vendor     2       System Setting     Secure     Public Write     3       Device     No Signature Test     Public Read     3       Radio Set     Static     Static	20SF, Secure 3:16:45:94:31
Role Settings  General S:  File Token:  STA/Wi-Fi  Netw	s: On lopment 096KB
AP/Wi-Fid     VILA     Private Key File Name:     Netw     Retwork Applic     Browse     Clear	: 4096KB iles: 2544KB 2,0x28,0x16
Files	
Service Pack Certification File Name: Trusted Root-C	>
Version: 1.0.17.5	1

r. Select "Select MCU Image" option in "Action" dropdown menu.

6	SimpleLink™ Image Creator – □ ×			
UniFlash				
🜵 Texas Instruments	Files > User Files	Service Pack  Certificate  Help		
General - devkit_app  Settings  System Setting  Bevice Radio Settings General Settings STA/WI-FI® Direct Device Network Settings AP/VI-FI® Direct GO WLAN Settings Network Settings Network Settings Network Settings	Check All   Uncheck All Action: Select Action Clear Select Action Select Action erties Select Action erties I action of the select MCU Image I action of the select M	Device status       ●         ● Connected: On       ●         ★ Device Type: CC3220SF, Secure       ●         ● MAC Address: 04:a3:16:45:94:31       ●         ■ HW Version: 48           > Programming Status: On          > Current Mode: Development         ■ Storage Capacity: 4096KB       ●         ● Formatted Capacity: 4096KB       ●         ■ SFLASH codes: 0xc2,0x28,0x16       ●         ● Security Alerts: 0 / 15       ●		
User Files Service Pack Trusted Root-Certificate Catalog	Version: 1.0.17.5 All rights reserved to Texas Instruments inc (c) - For more information go to our Help Pages	Disconnect		

s. Click on "Browse" button and navigate to devkit\_app binary located at (Debug-"<PATH TO DEVKIT APP BUNDLE>\app\src\devkit\_app\cc3220\CCS\Debug\devkit\_app.bin" and Release-"<PATH TO DEVKIT APP BUNDLE>\app\src\devkit\_app\cc3220\CCS\Release\devkit\_app.bin"

6	SimpleLink™ Image Creator		- 🗆 🗙
UniFlash			
🐺 Texas Instruments	Development Mode - Files > User Files		Service Pack Certificate Help
General - devkit_app Settings System Setting Device Role Settings General Settings STA/WI-Fi® Direct Device Network Settings AP/WI-Fi® Direct GO WLAN Settings Network Settings Network Settings	Check All   Uncheck All Action: Select MCU Image File Select MCU Image dummy-root-ca-cert	▼ Browse Properties  Properties	Device status     ▲ <ul> <li>Connected: On</li> <li>Device Type: CC3220SF, Secure</li> <li>MAC Address: 04:a3:16:45:94:31</li> <li>HW Version: 48</li> <li>Programming Status: On</li> <li>Current Mode: Development</li> <li>Storage Capacity: 4096KB</li> <li>Formatted Capacity: 4096KB</li> <li>SFLASH codes: 0xc2,0x28,0x16</li> <li>Security Alerts: 0 / 15</li> </ul>
User Files Service Pack Trusted Root-Certificate Catalog	Version: 1.0.17.5	×	Disconnect

### t. Select "Failsafe", "Secure" and "Public Write" options

ILANS INSTI-	MENIS LIGE	S Hear Files		Certificate 🛛 🕑 He
	File Name:		Max File Size: (actual size: 113504)	<b>~</b> ^
ieneral - devkit_ap	mcuflashimg.bin		524288	
Settings vstem Setting	🖉 Failsafe	Vendor		20SF, Secure
Device	<ul> <li>Secure</li> <li>No Signature Test</li> </ul>	<ul> <li>Public Write</li> <li>Public Read</li> </ul>		a3:16:45:94:31
<ul> <li>Radio Sett</li> <li>Role Settings</li> </ul>	Static			us: On
🖯 General Se	File Token:			elopment
STA/Wi-Fi Netw				4096KB
AP/Wi-Fi®	Private Key File Name:	· •		y: 4096KB Files: 2544KB
Netw				c2,0x28,0x16
Network Applic		Browse		15
User Files				
Service Pack	Certification File Name:			
Trusted Root-C		T		2
	Write			

u. Select "Private Key File Name" from the drop down menu and browse to "C:\TI\simplelink\_cc32xx\_sdk\_1\_02\_02\_00\tools\cc32xx\_tools\certificateplayground\dummy-root-ca-cert-key".

6	SimpleLink <sup>™</sup> Image Creator		- 🗆 ×
UniFlash			
TEXAS INSTRUMENTS Files > LIS	sor Filos		ertificate O Help
File Name:		Max File Size: (actual size: 113504)	
mcuflashimg.bin		524288	
General - devkit_ap			
System Setting	Vendor		20SF, Secure
Device     No Signature Test	Public Write     Public Read		3:16:45:94:31
Radio Sett     Static			
Role Settings			us: On
General St. Flie Token:			elopment
E STA/WIFI			4096KB
			y: 4096KB
WLAI Private Key File Name:	•		Files: 2544KB
Netw			c2,0x28,0x16
Network Applic     dummy-root-ca-cert-key	Browse Clear		15
Files			
Service Pack Certification File Name:			
Trusted Root-C	-		
	_		2
dummy-root-ca-cert			
Version: 1.0.17.5 All rights reserved		elp Pages	

v. Select "dummy-root-ca-cert" from "Certificate File name" dropdown menu.

inter de				
Flash				
Bin m I				
PIEXAS INSTRU	IMENTS Eilog >	Hear Eilae	A Durin Durin	ertificate 🛛 🖗 Help
	File Name:		Max File Size: (actual size: 171912)	
Conord, daukit on	mcuflashimg.bin		524288	
Sottinge				
System Setting	🖉 Failsafe	Vendor		20SF, Secure
Device	Secure	Public Write		3:16:45:94:31
😑 Radio Sett	Static	Public Read		
😑 Role Settings				us: On
🖯 General Se	File Token:			elopment
🗆 STA/Wi-Fi				4096KB
Netw				10 JOINE
	Private Key File Name:	Ŧ		у: 4096КВ Files: 2544КВ
Netw				-2.0x28.0x16
Network Applic	dummy-root-ca-cert-key	Browse Clear		
Files				
User Files				
Service Pack	Certification File Name:			
Trusted Root-C	dummy-root-ca-cert	•		-
	Write Cancel			

w. Click on add file icon as shown in below screenshot

	SimpleLink <sup>™</sup> Image Creator – □
niFlash	
🜵 Texas Instruments	Files > User Files
General - devkit_app Settings System Setting Device Radio Settings Role Settings General Settings STA/Wi-Fi® Direct Device Network Settings	Check All   Uncheck All Action: Select Action Execute  File  File  Mathematical Select Action  Execute  Connect: Select Action  Connect: Select Action
<ul> <li>AP/Wi-Fi® Direct GO</li> <li>WLAN Settings</li> <li>Network Settings</li> <li>Network Applications</li> <li>Files</li> <li>User Files</li> <li>Service Pack</li> <li>Trusted Root-Certificate Catalog</li> </ul>	х х
	Version: 1.0.17.5 All rights reserved to Texas Instruments inc (c) - For more information go to our <b>Help Pages</b>

x. Add "ajax\_script.js", "arrayentlogo.png" and "index.html" (located at *<DEVKIT RELEASE BUNDLE*>/app/devkit\_app/resources/arrayent) file using add button.

IEAAS INSTRUMENTS	Files > User Files		Service Pack Certificat	e 🕜 Help
			Device status	<b>▼</b> ▲
General - devkit_app	Check All   Uncheck All Action: Select Ac	tion • Execute	💲 Connected: Off	
Settings	Eil-	Properties		
System Setting		Properties		
Device				
Radio Settings	🗆 🖿 mcuflashimg.bin	🔒 🖺 512.0KB	Connect	
Role Settings	□ 🖿 dummy-root-ca-cert	🖺 1.0KB		
General Settings	🗆 🖿 ajax_script.js	🖺 2.7KB		
<ul> <li>STA/Wi-Fi® Direct Device</li> </ul>	arrayentlogo.png	巴 9.5KB		
Network Settings	index.html	🖺 5.3KB		
<ul> <li>AP/Wi-Fi® Direct GO</li> </ul>			2	
WLAN Settings				
Network Settings				
Network Applications				
Files	4	*		
User Files	•	r		
Service Pack				
Trusted Root-Certificate Catalog				
	Version: 1.0.17.5			
	All rights reserved to Texas Instruments inc (c) - For more in	formation go to our Help Pages		

6	SimpleLink <sup>™</sup> Image Creator		- 🗆 🗙
UniFlash			
🚸 Texas Instruments	Files > User Files		Service Pack Certificate O Help
General - devkit_app Settings System Setting Bevice Radio Settings General Settings STA/Wi-Fil® Direct Device Network Settings AP/Wi-Fil® Direct GO WLAN Settings Network Settings Sta-	Check All   Uncheck All Action: Select MCU Image	▼ Browse Properties ○ 512.0KB ○ 1.0KB	Device status <ul> <li>Connected: On</li> <li>Device Type: CC3220SF, Secure</li> <li>MAC Address: 04:a3:16:45:94:31</li> <li>HW Version: 48</li> <li>Programming Status: On</li> <li>Current Mode: Development</li> <li>Storage Capacity: 4096KB</li> <li>Formatted Capacity: 4096KB</li> <li>Available for User Files: 2544KB</li> <li>SFLASH codes: 0xc2,0x28,0x16</li> <li>Security Alerts: 0 / 15</li> </ul>
User Files Service Pack Trusted Root-Certificate Catalog	∢ Version: 1.0.17.5 All rights reserved to Texas Instruments inc (c) - For more information go to our Help	> D Pages	Generate Image

### z. Click on "Create Image" button to generate Image.

8	SimpleLink™ Image Creator	- 🗆 🗙
UniFlash		
👋 Texas Instruments	Generate Image	Service Pack Certificate Help
General - devkit_app ⊖ Settings System Setting	Create Image Create Image Program Image (Create & Program) Create OTA	Device status
<ul> <li>Device</li> <li>Radio Settings</li> <li>Role Settings</li> <li>General Settings</li> </ul>	SLI, TI format, for ImageCreator programming.	MAC Address: 04:a3:10:43:94  HW Version: 48
<ul> <li>STA/Wi-Fi® Direct Device</li> <li>Network Settings</li> <li>AP/Wi-Fi® Direct GO</li> <li>WLAN Settings</li> </ul>	UCF, TI format, for host programming.	<ul> <li>Storage Capacity: 4096KB</li> <li>Formatted Capacity: 4096KB</li> <li>Available for User Files: 2544KB</li> </ul>
Network Settings  Network Applications  Files  User Files	Bin, standard binary image file for Gang programming.	SFLASH codes: 0xc2,0x28,0x16           Security Alerts: 0 / 15
Service Pack Trusted Root-Certificate Catalog	Hex, standard intel-hex format file for Gang programming.	Disconnect
	Version: 1.0.17.5 All rights reserved to Texas Instruments inc (c) - For more information go to our Help Pages	

aa. On successful Image generation "Operation Successfully Completed " Message will pop up. Click on close button to close the popup.

6	SimpleLink™ Image Creator	- 🗆 🗙
UniFlash		
🐺 Texas Instruments	Generate Image	Service Pack Certificate Help
		Device status
General - devkit_app ⊟ Settings System Setting	Create Image Program Image (Create & Program) Create OTA	<ul> <li>% Connected: On</li> <li>★ Device Type: CC3220SF, Secure</li> </ul>
Device     Radio Settings     Role Settings		MAC Address: 04:a3:16:45:94:31     HW Version: 48     Programming Status: On
General Settings     STA/Wi-Fi® Direct Device     Network Settings	Operation Completed Successfully	<ul> <li>Current Mode: Development</li> <li>Storage Capacity: 4096KB</li> </ul>
AP/Wi-FI® Direct GO     WLAN Settings     Network Settings	Close	Formatted Capacity: 4096KB Available for User Files; 2544KB SFLASH codes: 0xc2,0x28,0x16
<ul> <li>Network Applications</li> <li>Files</li> <li>User Files</li> </ul>		Security Alerts: 0 / 15
Service Pack Trusted Root-Certificate Catalog		Disconnect
		1

bb. Click on "Save Image" to store ".sli" file to local storage.

	SimpleLink™ Image Creator	
hiFlash		
🜵 Texas Instruments	Generate Image	Service Pack Certificate Help
		Device status
General - devkit_app		% Connected: On
⊟ Settings	Create Image Program Image (Create & Program) Create OTA	Device Type: CC2220SE Secure
System Setting	harring angle that first	MAC Address: 04:s2:16:45:04:21
Device	image creation	<ul> <li>INAC Address: 04:a5:10:45:94:51</li> <li>INAC Address: 49</li> </ul>
Radio Settings	SLI, TI format, for ImageCreator	Tw Version: 46
Role Settings	Save Image	Programming Status: On
⊟ General Settings		Current Mode: Development
STA/Wi-Fi® Direct Device	UCF. TI format, for host programming.	Storage Capacity: 4096KB
Network Settings	0	Exemption Consulty 4006KP
WI AN Settings	Save OCF	Available for User Files: 2544KB
Network Settings		SELASH codes: 0xc2 0x28 0x16
Network Applications	Bin, standard binary image file for Gang	S 01 EN011 000003. 0x02,0x20,0x10
Files	Save BIN	Security Alerts: 0 / 15
User Files		
Service Pack	Hex, standard intel-hex format file for	
Trusted Root-Certificate Catalog	Gang programming.	Disconnect
	Version: 1.0.17.5	×
	All rights reserved to Texas Instruments inc (c) - For more information go to our Help Pages	

cc. Click in "Program Image(Create & Program)" button to Create and Program Image to device.

	SimpleLink™ Image Creator	_ (
Flash		
Texas Instruments	Development Mode - Generate Image	Service Pack Certificate O Help
	Connect, Create and Program Image	Device status
General - devkit_app		⁰ Connected: On
⊟ Settings	Create Image Program Image (Create & Program) Create OTA	
System Setting		<ul> <li>Device Type: CC3220SF, Secure</li> </ul>
Device		<ul> <li>MAC Address: 04:a3:16:45:94:31</li> </ul>
Radio Settings	SLI, TI format, for ImageCreator	💼 HW Version: 48
Role Settings	Save Image programming.	Programming Status: On
⊟ General Settings		Current Mode: Development
STA/Wi-Fi® Direct Device		• • • • • • • • • • • • • • • • • • • •
Network Settings	UCF, 11 format, for host programming.	Storage Capacity: 4090KB
<ul> <li>AP/Wi-Fi® Direct GO</li> </ul>	Save UCF	Formatted Capacity: 4096KB
WLAN Settings		Available for User Files: 2296KB
Network Settings	Bin, standard binary image file for Gang	SFLASH codes: 0xc2,0x28,0x16
Network Applications	programming.	Security Alerts: 0 / 15
Files	Save BIN	
User Files		
Service Pack	Hex, standard intel-hex format file for	
Trusted Root-Certificate Catalog	Gang programming.	Disconnect
	Version: 1.0.17.5	<u>s</u>

dd. On successful flash image to device, "Programming Complete" message will appear

<b>U</b>	SimpleLink™ Image Creator	- 🗆 🗙
UniFlash		
V TEXAS INSTRUMENTS	Generate Image	Service Pack Certificate O Help
General - devkit_app ⊟ Settings System Setting	Create Image Program Image (Create & Program) Create OTA	S Connected: Off
<ul> <li>Device</li> <li>Radio Settings</li> <li>Role Settings</li> <li>General Settings</li> </ul>	SLI, TI format, for ImageCreator programming.	Connect
STA/WI-FI® Direct Device Network Settings	Programming complete	
WLAN Settings Network Settings	Close	<u>×</u>
<ul> <li>Network Applications</li> <li>Files</li> <li>User Files</li> </ul>	programming.	
Service Pack Trusted Root-Certificate Catalog	Hex, standard intel-hex format file for Gang programming.	

# 5. Setup terminal program

We have taken TI CC3220 as a reference board for configuring terminal and arrayent credentials. Same will be applicable for others.

- a. Open a serial terminal program (example: TeraTerm or putty or minicom) and configure the serial port as shown in figures below:
  - i. For Teraterm (Setup->Serial Port):

<u>P</u> ort:	COM7	~	ОК
<u>B</u> aud rate:	115200	~	
<u>D</u> ata:	8 bit	~	Cancel
P <u>a</u> rity:	none	~	
<u>S</u> top:	1 bit	~	<u>H</u> elp
<u>F</u> low control:	none	~	
Transmit delay 0 msec/ <u>c</u> har 0 msec/ <u>l</u> ine			

ii. For Putty (Serial):

8	PuTTY Configuration	×
Category: 	Options controlling lo Select a serial line Serial line to connect to Configure the serial line <u>S</u> peed (baud) Data <u>b</u> its Stop bits Parity Flow control	cal serial lines COM4 115200 8 1 None V XON/XOFF V
About	<u></u> pe	en <u>C</u> ancel

iii. Configure and open minicom using following command:

\$ sudo minicom -D /dev/ttyUSB1

- b. Enable the "Local echo" on the terminal settings ( as shown below:
  - i. For Teraterm (Setup -> Terminal):

Tera Term: Terminal setup 🛛 🗙				
<u>T</u> erminal size	New-line			
80 X 24	<u>R</u> eceive: CR ↓			
✓ Term <u>s</u> ize = win size	Trans <u>m</u> it: CR ↓			
Auto window resize	Cancel			
Terminal ID: VT100 v	Help			
Answerback:	Auto switch (VT<->TEK)			
Coding (r <u>e</u> ceive)	Coding (tra <u>n</u> smit)			
UTF-8 v	UTF-8 v			
lo <u>c</u> ale: american	Code <u>P</u> age: 65001			

ii. For Putty (Terminal):

8	PuTTY Configuration	x
Category: Session Session Session Session Second Bell Seatures Window Appearance Behaviour Translation Selection Colours Connection Data Proxy Telnet Riogin SSH Serial	Puttry Configuration         Options controlling the terminal emulation         Set various terminal options         ✓ Auto wrap mode initially on         DEC Origin Mode initially on         DEC Origin Mode initially on         Implicit C <u>B</u> in every LF         Implicit LE in every CR         ✓ Use background colour to erase screen         Enable blinking text         Answerback to ^E:         PuTTY         Line discipline options         Local echo:         Auto         Force on         Force off         Remote-controlled printing         Printer to send ANSI printer output to:	
About	<u>O</u> pen <u>C</u> ancel	

Note: For Putty the Local line editing option value must be "Auto".

- iii. For Minicom:
  - For Teraterm Press following key Ctrl+A and Z it will give output similar to following screenshot:

	Minicom Command Summary	
OPTIONS: I18n Compiled on Jan 1 2014, 17:13:22. Port /dev/ttyUSB1, 17:19:04	Commands can be called by CTRL-A <key></key>	
Press CTRL-A Z for help on special keys	Main Functions Other Functions	
	Dialing alrectoryD run script (b0)G   Clear ScreenG   Send filesB Receive filesR   Configure MinicomO     comm ParametersP Add linefeedA   Suspend minicomD     Capture on/offL HangusH   eXit and resetX	
	send breakF initialize ModemM   Quit with no reset.Q     Terminal settings.T run KermitK   Cursor Key modeI     linguage op/off   W   local Echo on/off   E   Help screep   Z	
	Paste file	
	Select function or press Enter for none.	

- Select local Echo on by pressing E
- c. Connect the board to the computer using mini USB cable.
- d. Open the terminal and Press the RESET button.
- e. If the Serial Port settings are correct you will see the output similar to the below screenshot:



#### 6. Understanding Application State

Following table mentions the LEDs indication for each application state:

Application state	LED1	LED2
Running	ON	ON
Soft AP	ON	OFF
Init	ON	BLINK
Connect to Cloud	BLINK	ON
Connect to AP	OFF	ON
WPS	BLINK	OFF
ERROR condition	BLINK	BLINK
Update	OFF	BLINK
(Power down)	OFF	OFF

You will need to refer this table frequently in order to find what is the application state indicated by the LEDs' state.

# 7. Configure WiFi router credentials

**Note:** Please type console commands manually on console to configure WiFI router credentials and application credentials.

#### a. Using Web Browser

- i. Connect the development board to the computer using mini USB cable.
- ii. Open the terminal program.
- iii. Check that the application is in "Soft AP" state from the LED state.
- iv. Application goes to "Soft AP" state if WiFi router credentials are not previously configured.
- v. If application is not in "Soft AP" state press SW2 to go to "Soft AP" state.
- vi. Check that the application is in "Soft AP" state from the LED state.
- vii. Scan for Wi-Fi devices on your device(e.g. Mobile, laptop).



viii. Connect to "DevkitDemoXXXX" Wi-Fi AP using "ConnectMe" as a passphrase.(If device is already configured with device code then last 4 character will be replace by last 4 digit of device code).

	DevkitDemoXXX	xx	
	Password		
	ConnectMe		
	Show passwo	ord	
	Show advanc	ed options	
	Cancel	Connect	
ix.	Open web browser	r and type "192.1	168.1.1" in URL bar.
	192.168.1.1		×
х.	You will see the we	ebpage similar to	o following screenshot:
192.1	68.1.1/index.html	2	
	arrayent		
	Arrayent™ Device Configu	ration	
	Rescan		
	Please Select Network	•	

xi. Select the Wi-Fi AP using "Please Select Network" scroll down list. If somehow you are not able to see your Wi-Fi AP in the scroll down list then Select "<manually enter SSID>" Option and enter Wi-Fi credential manually.

Ŧ	. 🖬 💀 🍵 🤋 📶 32% 🚊 3	:28 PN	Л
1	Please Select Network	0	
	<manually enter="" ssid=""></manually>	0	
	MBLAZE-AC3633R2-EFE7	0	
	Zealous_Main	0	
	VT_Guest	0	
	Cisco02165	0	
	ssguest	0	
	VT_Wing-3	0	
	Private_Ay4	$\bigcirc$	

xii. Once SSID is selected or manually entered you will see the output similar to following screenshot:

192.168.1.1/index.html	2	:
arrayent		

#### Arrayent<sup>™</sup> Device Configuration

Rescan			
SSID	Belkin_Ay		
Select Security	OPEN V		
Enter a Password			
	Connect		

i. Select Wi-Fi AP security using "Select Security" scroll down list

OPEN	٢	
WEP	$\bigcirc$	
WPA PSK	$\bigcirc$	
WPA2 PSK	$\bigcirc$	
Enter passphrase in "Enter a Pa	assword" T	extbox.
192.168.1.1/index.html	2	
arrayent Arrayent <sup>™</sup> Device Configurat	ion	
Rescan		
SSID Belkin_Ay Select Security Enter a Password I2345678 Connect		

iii. Click on Connect button.

ii.

192.168.1.1/index.html	2	•
arrayent		
Arrayent™ Device Configuration		
Rescan		
SSID Belkin Ay Select Security WPA PSK V		
Enter a Password 12345678 Connect		
Device Attempting connection		
Web server and access point stop See UART for further information		

iv. On successful connection with your WiFi router you will see the application switching its state to "Connect to Cloud" from LED state.

#### b. Using WPS

- i. Connect the development board to the computer using mini USB cable.
- ii. Open the terminal program.

iii. Check that the application is in "Soft AP" state from the LED state. Application goes to "Soft AP" state if WiFi router credentials are not previously configured.

- iv. If application is not in "Soft AP" state press SW2 to go to "Soft AP" state.
- v. Check that the application is in "Soft AP" state from the LED state.
- vi. Push the SW1 push button.
- vii. Check that the application is in "WPS" state from the LED state.
- viii. Press WPS button on your WiFi router.
- ix. On successful connection with your WiFi router you will see the application switching its state to "Connect to Cloud" from LED state.

#### c. Using console commands

Note:- Please configure "wpassphrase" after configuring "ssid" and "wsecurity".

- i. Follow steps i ii from section a. Using DevKit Smartphone app.
- ii. Enter the following commands on the terminal console to configure your WiFi router credentials:

demo&cset@1:ssid,<*your\_ssid>#* demo&cset@2:wsecurity,<*security\_level>#* demo&cset@3:wpassphrase,<*your\_passphrase>#* 

where, security\_level can have one of the following values:

- 1 WEP
- 2 WPA PSK
- 3 WPA2\_PSK
- iii. Reset the board by pressing RESET push button.
- iv. On successful connection with your WiFi router you will see the application switching its state to "Connect to Cloud" from LED state

### 8. Setup ACA configuration and connect to cloud

- a. Please make sure that you have already configured the WiFi router credential using one of the methods described in section 6. Configure WiFi router credentials.
- b. Check that the sample application is in "Connect to Cloud" state from the LED state.
- c. Connect the board to the computer using mini USB cable.
- d. Open the terminal program.
- e. Enter the following commands on the terminal console to configure ACA device credentials provided to you in your DevKit credentials email:

demo&cset@001:dev\_name,<*device-name>#* demo&cset@002:dev\_pass,<*device-password>#* demo&cset@003:dev\_aes\_key,<*device-aes-key>#* demo&cset@004:prod\_id,<product-id># demo&cset@005:prod\_aes\_key,<product-aes-key>#

- f. On successful ACA configuration the application will try to connect to the Arrayent cloud.
- g. To configure arrayent cloud other than default value, Enter following command on the terminal console:

demo&cset@004:cloud\_url,</a>load-balancer>#

 On successful cloud connection the sample application will switch to "Running" state and send application attributes' state to the cloud. You can check application state from LED state.

You have now successfully completed the sample application setup required to connect to the cloud.

# **Chapter 4: Configuring the Arrayent Cloud**

In this section you use the Arrayent Configurator web application to create a device data model in the Arrayent Cloud. Then you create a Customer Account in the Arrayent Cloud, which you will use later on to monitor and control your device.

### 1. Logging In to the Configurator

Follow the instructions below to learn how to log in to the Arrayent Configurator web application.

a. Open a web browser and go to https://devkit-api.arrayent.com:8081/ Configurator unless Arrayent has instructed you otherwise.

ARRAYENT	Configurator
System Account Name: System Account Password:	gin

- b. Enter your System Account credentials into the login form. These credentials are listed in the email you received from Arrayent.
- c. Click Login.

#### 2. Creating a Device Data Model

In this section you learn how to create a device data model using the Arrayent Configurator web application. In Arrayent terminology a device data model is referred to as a "Device Type".

#### Creating the "Devkit\_app" Device Type

The name of the Device Type we are creating will be called "Devkit\_app".

a. Click the **Device Types** tab to go to the Device Types page of the Configurator.



This page enables you to create, modify, and delete device data models.

Cus	tomer Attributes	Devices	Notifications	Device Types	Customer	Accounts	Native Device Types	Global	Alerts Tro	ublesho
			Device Ty	pes (Click on a	device type	to load the a	ttibutes)			
			A =		a a a a a a a a a a a a a a a a a a a	io iouu iiio u				
		💿 Add	🖉 Edit 🛛 🥥 De	lete						
				Dev	ice Attributes					
💿 A	dd 🥒 Edit 🌾	Delete								
Name	e Display Name		Hardware Attr.	IO Type Sto	re by Server	Time Series	Data Type	Global	Global Value	Enum
	and provide the second			.,,,						

- c. For Device Type Name enter Devkit\_app.
- d. For Device Type Display Name enter Devkit\_app.

Device Type	×	
Device Type Name Device Type Display Name	Devkit_app Devkit_app	
	Save Cancel	

e. Click Save.

#### **Creating Device Attributes**

In this section you use the Configurator to define Device Attributes, called SW1\_count, Led1\_cmd and Led1\_State.

- a. Look at the Device Types page of the Configurator. You should see two tables. The top table is titled Device Types. The bottom is titled Device Attributes.
- b. Click on the row containing our new Device Type, Devkit\_app. This should highlight the row in blue

	Device Types (Click on a	device type to load the attibutes)
🔘 Add	🧪 Edit 🤤 Delete	
Type Id	Type Name	Type Display Name
387	Devkit_app	Devkit_app

c. In the bottom table titled **Device Attributes** click the **Add** button.

Add     Image: Constraint of the system       Type Id     Type Name       387     Devkit_app   Devkit_app		Device Types (	Click on a device type to load the attibutes)
Type Id     Type Name     Type Display Name       387     Devkit_app     Devkit_app	🕜 Add	🥖 Edit 🛛 🥥 Delete	
387 Devkit_app Devkit_app	Type Id	Type Name	Type Display Name
	387	Devkit_app	Devkit_app

	_			Device Attribute	s				
💿 Ado	I 🥖 Edit 🥥 Delete								
Name	Display Name	Hardware Attr.	IO Type	Store by Server	Time Series	Data Type	Global	Global Value	Enum

d. Fill out the form so that your new Device Attribute matches the image below. Click **Save** when finished.

Device Attribute	×
Name:	SW1_count
Display Name	SW1_count
Time Series	
Hardware Attribute	
Hardware IO Type	From device 🔹
Stored by Server	
Attribute Data Type	BEIntegerSigned32Bi 🔻
Global	
Global Attribute Value	
Enumerated Alias	1
	Save Cancel

e. Now repeat the process to create another Device Attribute that matches the images below:

Device Attribute	×
Name:	Led1_cmd
Display Name	Led1_cmd
Time Series	
Hardware Attribute	
Hardware IO Type	To device 🔹
Stored by Server	
Attribute Data Type	Boolean 🔻
Global	
Global Attribute Value	
Enumerated Alias	2
	Save Cancel

Device Attribute	×
Name:	Led2_cmd
Display Name	Led2_cmd
Time Series	
Hardware Attribute	
Hardware IO Type	To device 🔹
Stored by Server	
Attribute Data Type	Boolean 🔻
Global	
Global Attribute Value	
Enumerated Alias	4
	Save Cancel

See <u>Device Types Guide</u> for a description of how these fields affect a Device Attribute definition.

### 3. Creating a Customer Account for Monitor and Control

Follow the instructions in the next section to learn how to create a new Customer Account in the Arrayent Cloud. Later on you will log in to the Arrayent Cloud as this Customer Account and then monitor and control your evaluation board.

#### a. Using Configurator:

- i. Enter the username of the new account in the text field next to **Customer Account Name**.
- ii. Select the checkbox. This will enable you to enter text in the textbox next to **Customer Account Password**.
- iii. Enter the password of the new account.
- iv. Leave Master Account Name empty.
- v. Enter values for the other user attributes as needed. All attributes other than username and password are optional.
- vi. Click Save.

#### b. Using Devkit Android Application:

i. "Devkit" android application Home page will look similar to the below screenshot:



ii. Click on **GET STARTED** button. you will see the output similar to the below screenshot:

R 🗳 🄇	) <b>(</b>	 13% 📋	12:29	PM
Creat	e Account			
	agree to the			

 Fill account details and tick on I agree to the Terms & Conditions box to create account on Arrayent cloud. Click on CREATE button. After that you will see the output similar to the below screenshot:

Account vernication
Check your email
An email has been sent to the address you provided. Please enter activation code.
Enter Activation Code
CONTINUE

iv. Enter verification code send to your email ID entered during create account details. Click on **CONTINUE** button. On successful account creation you will see the output similar to the below screenshot:

💀 🖬 🔇 🖳 🛛 🛸 🏋 📶 9% 🔤 12:45 PM
Account Verified
Account Verified
~
LOGIN



 Enter Device ID in first Box and Device Password in another box. click on "CONTINUE" to Add device to your account. On successful Association of device with account you will see the output similar to the below screenshot:

, 🔜 🛞 ເ	Ê	- 📉 🛜 📶 4%	12:53 PM
= DE			
LEDs			
$\odot$	Fetching	device details.	
Device h currently	as been as: it is offline	sociated acco	unt but
e latest stati	us of the de	eviće RETR	1

	Home	Customer Attributes	Devices	Notifications	Device Types	Customer Accoun
Re	trieve Cus	tomer Account:			- Retrieve	
		Customer accou	nt attributes			
Customer Ac	count Nam	ne 🚺				
Customer Ac	count Pas	sword	3		Save New	
Master Acco	unt Name		e		Password	
Your email A	ddress					
Phone Numb	er		4			
Street Addres	SSS					
		(	5			

When you log in to the Utility app as the new Customer Account, you will need to provide the App ID (A.K.A. System Account ID) of the Customer Account. Customer Accounts inherit the App ID of the System Account that created the account. So if a System Account named "admin" with App ID "10" creates a Customer Account named "user", the App ID of "user" will also be "10".

# Chapter 5: Monitoring and Controlling the DevKit board

# **Using Arrayent Utility Web application**

In this section you use the Arrayent Utility web application to monitor and control your evaluation board.

#### a. Logging In to the Utility Application

Follow the instructions below to learn how to log in to the Arrayent Utility web application.

- Open a web browser and go to the URL below, unless instructed otherwise by Arrayent.
   <u>https://devkit-api.arrayent.com:8081/Utility</u>
- ii. Log in with the Customer Account credentials that you created earlier with the Configurator.



Customer Account Name
Customer Account Password
System Account Id
Login

#### b. Adding the device to your account

In the **Arrayent** Cloud, a device (in this case, your evaluation board) must be owned by a Customer Account before it can be monitored and controlled. i. Click the **Devices** tab.

Utility Appl	lication		UCTRIZEDZ	Lugua
		Home Devices Monitor and Control	I Multi Attributes Alerts	Customer Info
	Build Information			
	Release Version: 1.16.1-RC-09			
	<b>Release Date :</b> 23 Sep 2014 18:1	0:52 -0700 (PDT)		
ii. C	Click Add.			

		nome	DEVICES		HIGHUS	Customer in
	Devices					
🗿 Add 🥥 Del	ete					
Device Code	Device Type		Description			

iii. For **Device Name** enter the value of device\_name in your email from Arrayent.

- iv. For **Device Password** enter the value of device\_password in your email from Arrayent.
- v. For **Device Type** select Devkit\_app.
- vi. Click Save.

The device is now claimed by this Customer Account. No other Customer Account can access this device.

#### c. Controlling the LED

- i. Follow the instructions below to learn how to use the Utility application to remotely control the LED on your evaluation board.
- ii. Note the **Device Name** drop down menu. If you had multiple devices you would select your device from this menu.
- iii. Click the Monitor and Control tab.
- iv. Find the row containing the Led1\_cmd attribute.
- v. Click the ON radio button in the Led1\_cmd row.
- vi. Look at your evaluation board. The LED1 should be on.
- vii. Click the OFF radio button.
- viii. Look at your board again. The LED should be off now.
- ix. The Led1\_State attribute slider bar in the utility app will show the current state of the LED1.

#### d. Monitoring Push Button Events

In this section you use the Utility application to monitor push button events on your evaluation board.

- i. You should still be on the Monitor and Control page of the Utility application. If not, go back to that page now.
- ii. Find the row containing the SW1\_count attribute.
- iii. Press and release the push button on your evaluation board labeled SW1.
- iv. You should see the SW1\_count increment each time you press SW1 push button.

# **Using Devkit Android Application**

In this section you use the Devkit Android application to monitor and control your evaluation board.

#### a. Logging In to the Devkit Android Application

Follow the instructions below to learn how to log in to the Devkit application.

i. Open a Devkit application and Click on "I already have account" button.



**ii.** Log in with the Customer Account credentials that you created earlier with the Devkit android application.Click on **SIGN IN** button.

R 🗷 🖆	) 🔌 🛜 🔏 13% 🔤 1.2	2:28 PM
	<b>Ö</b> DEVKIT	
		SHOW
	FORGOT PASSWORD?	
	CREATE ACCOUNT	

### b. Adding the device to your account

In the **Arrayent** Cloud, a device (in this case, your evaluation board) must be owned by a Customer Account before it can be monitored and controlled.

i. If you don't have QR code then click on ENTER SERIAL NUMBER INSTEAD.

🗟 🖻 🔊	🔌 🍞 🔏 8% 📃 12:46 PM
SCAN CODE	
Scan the QF	R Code under your device.
Place a QR Code insid it.	
F	7
Center the C Avoid	QR code then tap to focus. glare and shadows.
ENTER SEF	RIAL NUMBER INSTEAD

ii. Enter Device ID in first Box and Device Password in another box. click on "CONTINUE" to Add device to your account.

🔜 🔤	x 🖻 🔨	<u> </u>	8% 12:	47 PM
ENTE	R SERIAI			
	Ente	er serial number		
			-	

iii. On successful Association of device with account you will see the output similar to the below screenshot:

🗟 🛋 🔊	Ę	M 🔋 📶	4% 🚺 12:53 PM
DE∖			
LEDs			
$\bigcirc$	Fetching c	levice detai	ls
Device ha	is been ass	ociated acc	count but
currently	it is offline		
e latest statu	s of the de	vice RET	RY

The device is now claimed by this Customer Account. No other Customer Account can access this device.

#### c. Controlling the LED

- i. Follow the instructions below to learn how to use the Devkit android application to remotely control the LED on your evaluation board.
- ii. Once device is online you will see screen similar to following:



- iii. Click the LED1 switch.
- iv. Look at your evaluation board. The LED1 should be on. Devkit application screen will be similar to following screenshot:



- v. Click the LED1 switch again.
- vi. Look at your board again. The LED should be off now.
- vii. The Led1\_State attribute slider bar in the utility app will show the current state of the LED1.

#### d. Monitoring Push Button Events

In this section you use the Devkit android application to monitor push button events on your evaluation board.

- i. You should still be on LEDs tab of the Devkit android application.
- ii. Click on SW1 tab to monitor switch press(SW1).
- iii. Press and release the push button on your evaluation board labeled SW1.
- iv. You should see the count increment each time you press SW1 push button.



# Using Console commands to Update Attribute value

#### a. Monitoring and setting Temperature:

- i. ACA must be connected with Arrayent Cloud and sample application should be in Running state (verify from LED state).
- ii. Find the row containing Temperature attribute. This attribute gets updated by the application. Please follow Chapter 7 for further details of this attribute.
- iii. You can set temperature from console command. Below is example to set Temperature attribute value to 100. Verify the Temperature attribute is updated with value 100.

demo&update@02:settemp,100#

#### b. Setting SW1 Count:

- i. ACA must be connected with Arrayent Cloud and sample application should be in Running state (verify from LED state).
- Find the row containing SW1\_count attribute. You can update the SW1 count from the console commands. Below is the example command to increase push button count. The value of SW1\_count attribute will be incremented by 1.

demo&update@02:pushButton,1#

#### c. Sending Property message:

- i. ACA must be connected with Arrayent Cloud and sample application should be in Running state (verify from LED state).
- ii. You can send single property message to Arrayent cloud using console command. Below is the sample command to set value of sys-ping attribute. You can verify that the value of sys-ping is updated to devkit\_sample\_app.

demo&sendkvp@02:sys-ping,devkit\_sample\_app#

# **Chapter 6: Next Steps**

Congratulations! You just learned how to use the Arrayent Connect Platform to monitor and control a connected device.

- Read the <u>Architecture Overview</u> to understand how the Arrayent Connect Platform enables connectivity in your devices.
- Check out the source code of the Arrayent sample application to learn how to use the ACA in your own application. Relative to the file that you downloaded from Arrayent, the sample application directory is located at <Release Package>/app/src/devkit\_app. Check out the Makefile (arrayent\_demo.mk) and the application source code to learn how to include the ACA library into your own project.
- Read the <u>ACA API Reference</u> for complete details on the ACA's features.
- Read the <u>ACA Developer's Guide</u> for higher-level guides on implementing a connected device application that uses the ACA.

# **Chapter 7: Appendix**

# 1. Sample application Data Model

We have only added a part of the device attributes supported by the sample application on the "Devkit\_app" data model. The sample application supports attributes listed in the following table:

Attribute name	Description	Туре	Directio n	Default Value Upon reset
ConnectionTyp e	Reports if the application is connected to the cloud using TCP or UDP	String (TCP, UDP)	To Cloud	UDP
SW1_count	Reports the number of times that SW1 has been pressed since it was reset	Integer32	To Cloud	0
SW1_count_re set_cmd	If this is TRUE the embedded app resets the SW1_count to 0 and then modifies this attribute to FALSE	BOOLEAN	From Cloud	
Led1_cmd	Command to set Led1 to ON or OFF	Boolean (ON, OFF)	From Cloud	
Led2_cmd	Command to set Led1 to ON or OFF	Boolean (ON, OFF)	From Cloud	
Led1_state	Reports the state of LED1	Boolean (ON, OFF)	To Cloud	OFF
Led2_state	Reports the state of LED3	Boolean (ON, OFF)	To Cloud	OFF
Temperature	Reports the temperature read from the temperature sensor in 1/100s of a degree (e.g. 7520 means 75.20 degrees)	Integer16	To Cloud	0xFFFF
TemperatureIn crement	Set by cloud to determine upon what change in temperature should the application report a change of temperature to the cloud Default is 100 (i.e. every full degree)	Integer	From Cloud	

ReadTimeAnd Date_cmd	Command to application to get the time and date	Boolean	From Cloud	
TimeAndDate	Last time and date read from cloud	String	To Cloud	1-Jan- 1970
UpdateNow_c md	Flag indicating to application that it must perform a firmware update	BOOLEAN	From Cloud	
UpdateURL	URL of where to find updated software	String (URL format)	From Cloud	
RefreshAllAttri butes_cmd	Command from cloud to force application to send all the "To Cloud" attributes in the data model using the API ArrayentSetMultiAttribute()	Boolean	From Cloud	
SetRecvMultiAt tribute_cmd	Cloud can set this to make application change from/to SingleAttribute mode to/from MultiAttribute mode	Boolean FALSE=Singl e TRUE=Multi	From Cloud	
MultiAttribute_s tate	Reports if the application is using single or multi attribute to receive properties from the cloud	Boolean FALSE=Singl e TRUE=Multi	To Cloud	0
Application_sta te	Description of the state in which the application is currently running. Mostly used to indicate it is going to enter the Soft-AP state or it is Running or it is Upgrading	String	To Cloud	Init
RSSI	Reports the RSSI value to the cloud every 15 minutes	Integer	To Cloud	
app-version	Description of the internal version of the embedded application	String	To Cloud	0.0.0.0
app-timezone ENUM: 206	Contains a value in minutes of the time difference between the device's local timezone and UTC	Integer	From Cloud	0
app-dstflag ENUM: 207	The daylight savings time flag is a boolean that daylight savings is applicable in the device's local zone	BOOLEAN	From Cloud	0

	ACA internal version	String	To Cloud
sys-version			
sys-ping	ACA internal	String	From Cloud
sys-pong	ACA internal – reflects what is sent to sys-ping	String	To Cloud