



MPLAB® Code Configurator Setup for Software Development on PIC32CX_BZ2/WBZ45x

Pre-requisite: Clone the EA71C53A repo available @ <https://github.com/MicrochipTech/EA71C53A.git>

1. Versions of different components and tool chain required for test this package

IDE, Compiler, MCC plugin	Version	Location
MPLAB X IDE XC32	6.00 4.10	IDE Compiler
MCC Plugin	5.1.4	MPLAB X IDE > Tools > Plugins

Harmony components to be cloned with MCC Plugin	Version	Location
csp	3.12.0	MPLAB® Code Configurator Content Manager
core	3.10.0	MPLAB® Code Configurator Content Manager
mhc	3.8.5	MPLAB® Code Configurator Content Manager





dev_packs	3.12.0	MPLAB® Code Configurator Content Manager
bsp	3.12.0	MPLAB® Code Configurator Content Manager
CMSIS-FreeRTOS	10.3.1	MPLAB® Code Configurator Content Manager
crypto	3.7.6	MPLAB® Code Configurator Content Manager
wolfssl	4.7.0	MPLAB® Code Configurator Content Manager
PIC32CX-BZ_DFP	1.0.80	EA71C53A \MPLAB X IDE
wireless	222105	EA71C53A\H3
wireless_system_pic32cxbz_wbz	222105	EA71C53A \H3
wireless_apps_pic32cxbz2_wbz45	222105	EA71C53A \H3

Note: The component versions mentioned above are the versions with which this entire package was tested on by Microchip.





Checking out a particular version of Harmony Component

Local Disk (C:) > mchp > csp

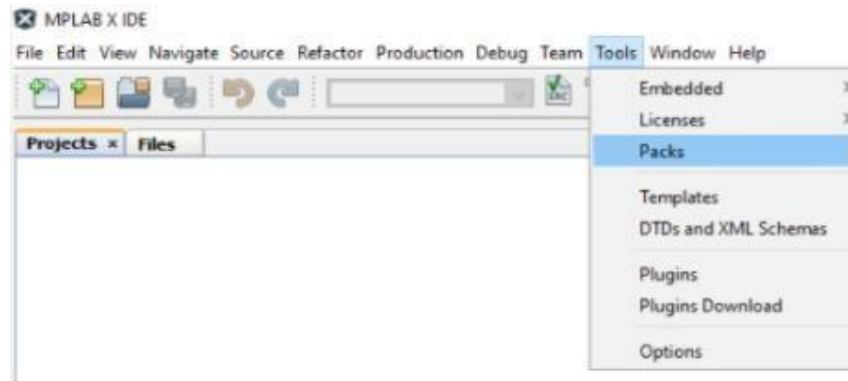
Name	Date modified	Type	Size
.git	1/29/2022 9:35 PM	File folder	
apps	1/29/2022 9:34 PM	File folder	
arch	1/29/2022 9:34 PM	File folder	
doc	1/29/2022 9:34 PM	File folder	
docs	1/29/2022 9:35 PM	File folder	
peripheral	1/29/2022 9:35 PM	File folder	
.gitattributes	1/29/2022 9:34 PM	Text Document	1 KB
.gitignore	1/29/2022 9:34 PM	Text Document	1 KB
module	1/29/2022 9:34 PM	XML Document	1 KB
mplab_harmony_license	1/29/2022 9:34 PM	MD File	21 KB
package	1/29/2022 9:35 PM	XML Document	1 KB
readme	1/29/2022 9:35 PM	MD File	4 KB
release_notes	1/29/2022 9:34 PM	MD File	53 KB

```
MINGW64:/c/gchp/csp
C17143@CHN-LT-C17143A MINGW64 /c/mchp/csp ((v3.11.0))
$ git checkout v3.10.0
Previous HEAD position was 3014cad27 [Doc] Updated release notes for v3.11 release
HEAD is now at 6048f9018 [Doc] Updated apps readme.md
M    peripheral/clk_pic32cx_bz/templates/plib_clk.c.ftl
C17143@CHN-LT-C17143A MINGW64 /c/mchp/csp ((v3.10.0))
$
```

2. Install [MPLAB x IDE](#) (No Apple M1 chip support, user could use traditional intel based MAC's)
3. Install [XC32 Compiler](#)
4. Install Device Family Part Pack, located in EA71C53A\MPLAB X IDE

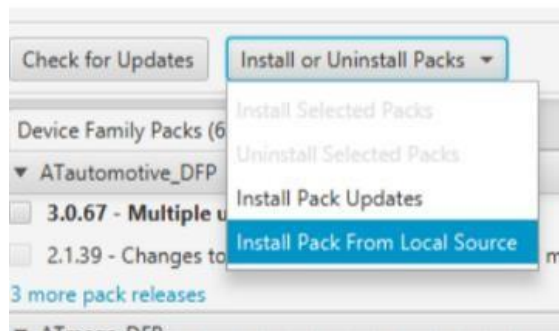
Device Family Packs are device description files (.PIC files for PIC® devices, .ATDF files for AVR® and SAM devices), which contain SFR names, memory regions, programming information. Device-dependent source code files (i.e., peripheral header files) are being moved to DFPs. XC8 (AVR target) and XC32 (SAM target) are implemented today. Libraries will be part of the DFP on XC8 (AVR, CSTARTUP) and XC32 – XC16 will store the libraries in the compiler directory.





4.1 Open the MPLAB X IDE and select Tools > Packs

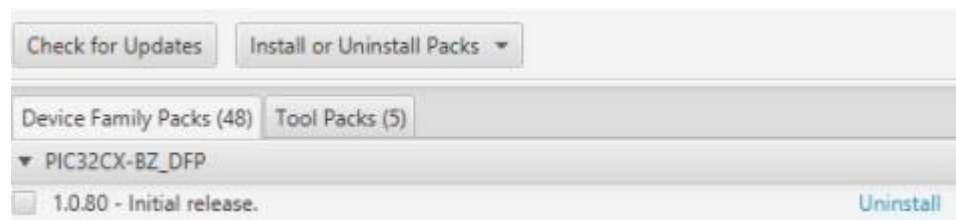
4.2 Click “Install from Local Source”



4.3 Locate (EA71C53A\MPLAB X IDE) and select the device family pack Microchip.PIC32CXBZ_DFP-1.0.xx in MPLAB X IDE directory

Local Disk (C:) > EA71C53A > MPLAB X IDE				
Name	Date modified	Type	Size	
Microchip.PIC32CX-BZ_DFP-1.0.80	1/27/2022 10:55 PM	Atmel Pack File	3,504 KB	
MPLABX_IDE	1/26/2022 7:47 PM	Adobe Acrobat D...	86 KB	

4.4 **Verify** the installation of device family pack by searching in the window – search for “bz” keyword



Restart MPLAB X IDE





5. Exclude Device checks for kits (Tools -> Options -> Embedded) , select “ok” once done!





Options

General Editor Fonts & Colors Keymap Embedded Team Appearance Plugins Miscellaneous

Generic Settings Project Options Build Tools MISRA Check Managed Tools Suppressible Messages Diagnostics Other

Projects Folder: C:\Users\c17143\MPLABXProjects

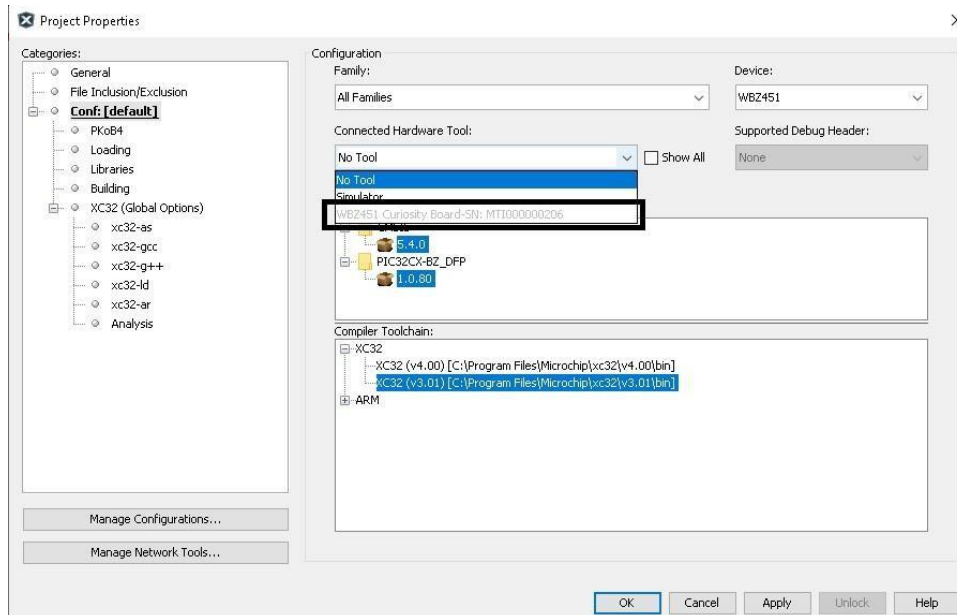
Maintain active connection to hardware tool	<input checked="" type="checkbox"/>
Read Device Memory To File: Export only memory used	<input type="checkbox"/>
Silent build	<input type="checkbox"/>
Enable alternate watch list views during debug sessions	<input type="checkbox"/>
Disable auto refresh for call stack view during debug sessions.	<input type="checkbox"/>
On mouse-over structure and array expressions during a debug se...	<input checked="" type="checkbox"/>
Show unresolvable variable names in watch window during debug s...	<input type="checkbox"/>
Enable Gathering of Compiler symbols	<input checked="" type="checkbox"/>
On mouse-over source lines in editor, evaluate break point status.	SHIFT+Mouse
Hold-off period before memory view synchronization: Give priority t...	1 Second
Debug Reset @ (Following reset action during paused debug sess...	Main
Debug startup (Following debug project action)	Run
Default Charset	ISO-8859-1
Exclude device checks for kits	<input checked="" type="checkbox"/>
XC Code Coverage Report Type	HTML

Export... Import... OK Apply Cancel Help

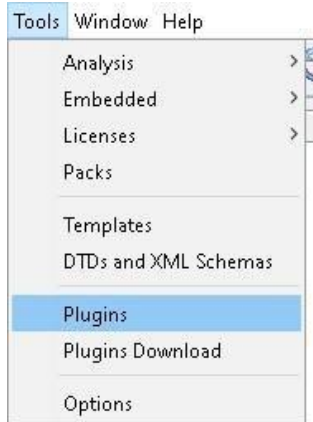
Note: Some preproduction boards might have “PIC32CX1012BZ25048” Soc Name programmed on PKOB4, if the “Exclude device checks for kits” is not enabled, user will not be able to choose the PKOB4 to program the WBZ451 module on the Curiosity Board

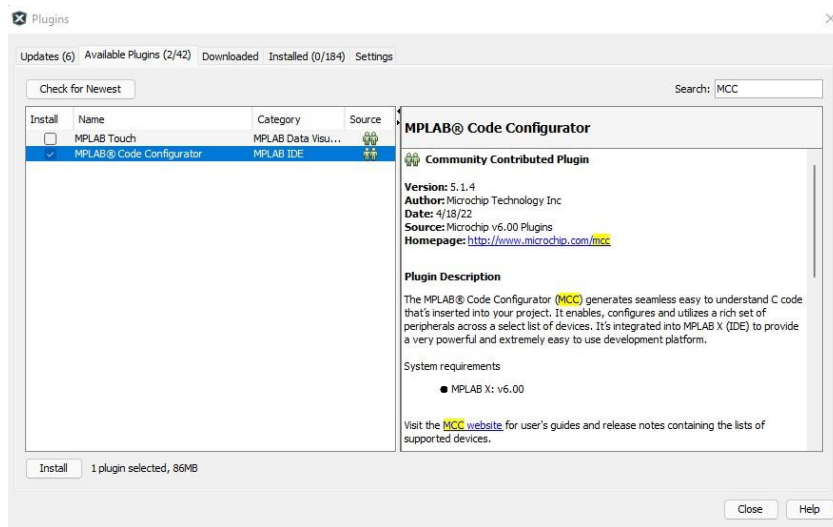
User cannot select the Kit (It will appear greyed out) in Programming options if “Exclude Device Checks” is not enabled





6. Delete the .mcc folder available in the following path – “C:/Users/user_name/”
Note: “user_name” is the user profile
7. Install MCC plugin in the IDE, restart the IDE after installation (uninstall any older version of MCC, use MCC v5.1.4 or above)

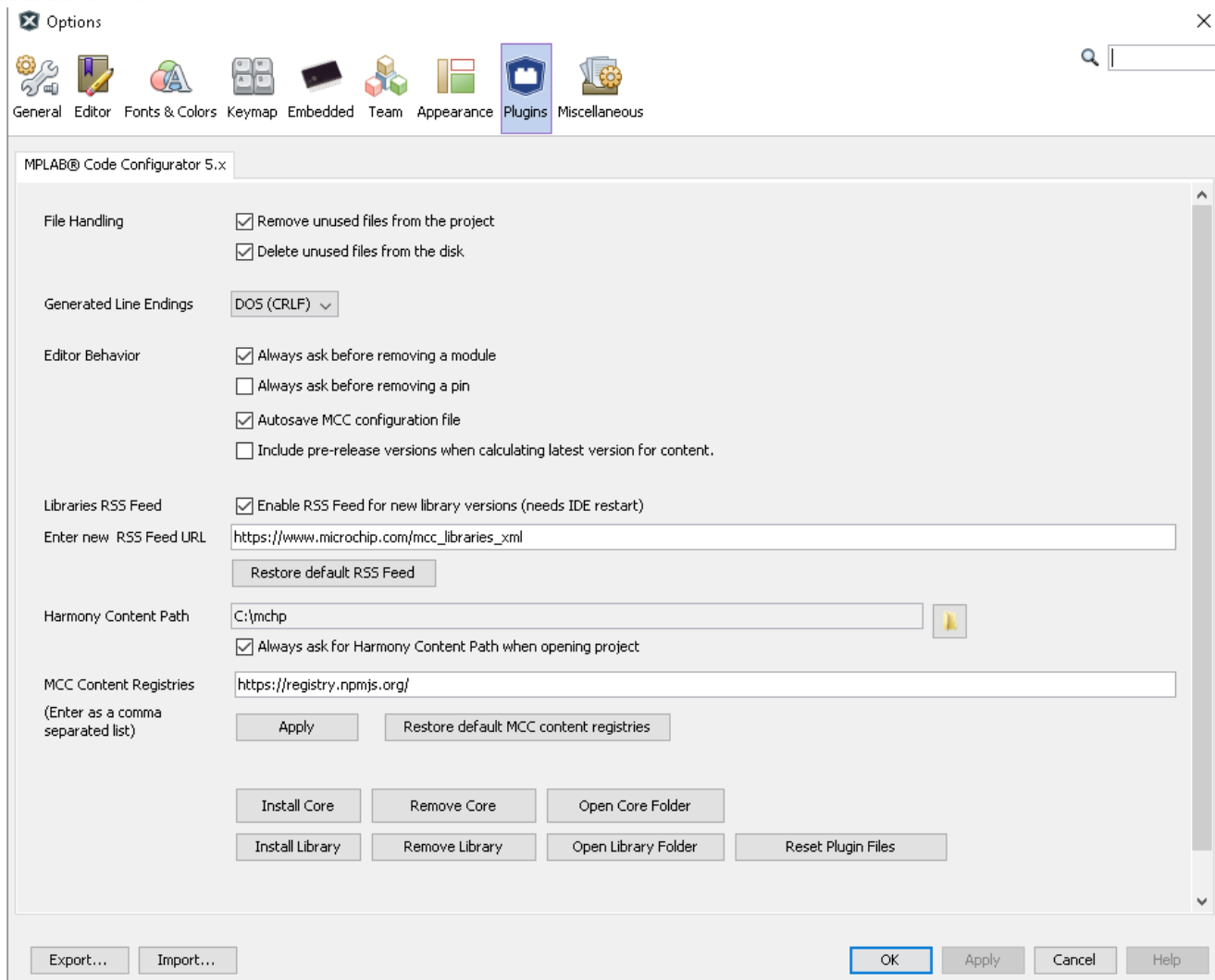




8. Configure the Plugin Options

Several aspects of the operation of the MCC can be managed by using the “Options” panel (see figure below), which can be invoked by clicking Tools → Options → Plugins → MPLAB Code Configurator in the menu bar of the MPLAB X IDE.





Note: “Harmony Content Path” should be in root directory (maximum 1 folder deep and folder name cannot exceed 4 letters)

For example -> **C:\mchp** or **C:\test** are **acceptable** “Harmony Content Path”



C:\Microchip
C:\test\microchip are **not acceptable** path choices.

This note is added to avoid a known issue of Maximum File path, see [here](#) for more information

9. Clone the Harmony repositories (required content for SW Development) using MCC Content

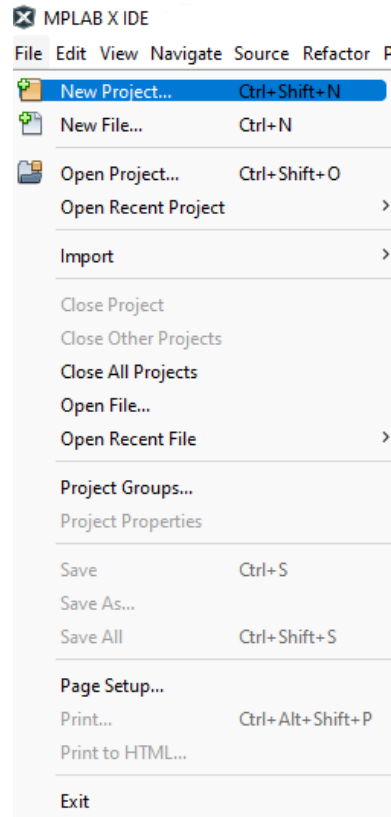




Manager Wizard

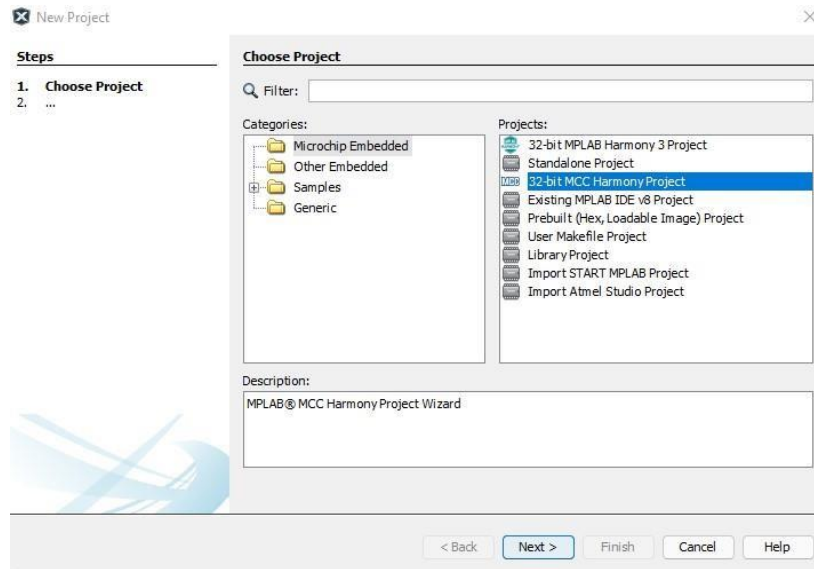
9.1 Create a new “MCC Harmony” project (In order to clone the Harmony repositories user needs to create an empty project and clone the required repositories)

9.1.1 Select “New Project”

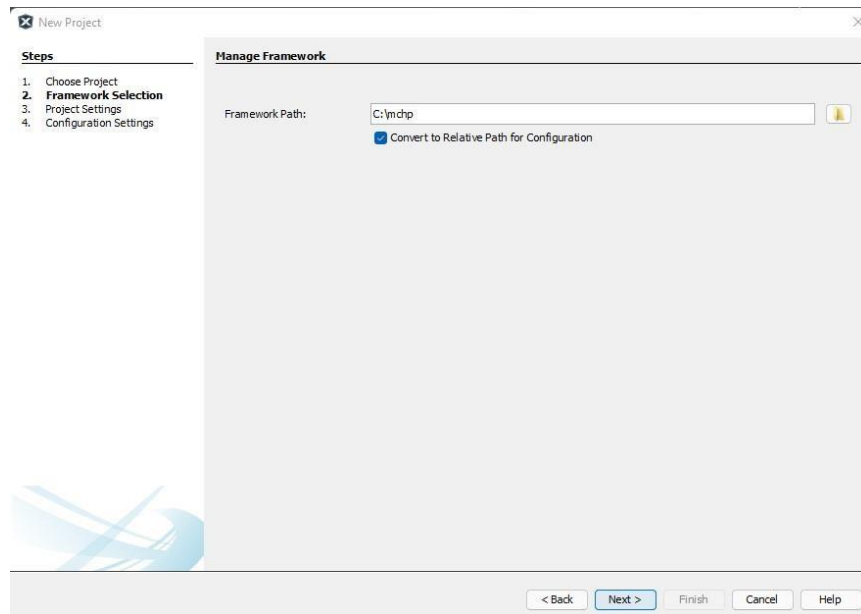


9.1.2 Select “32-bit MCC Harmony Project”





9.1.3 Framework Selection



9.1.4 Project Settings





New Project

Steps

1. Choose Project
2. Framework Selection
3. **Project Settings**
4. Configuration Settings

Name and Location

Location: C:\Users\user\HarmonyProjects\MyProject_4

Folder: newProject

Name:

Path: C:\Users\user\HarmonyProjects\MyProject_4\firmware\newProjectX

Show Visual Help

< Back Next > Finish Cancel Help

9.1.5 Configuration Settings, click “Finish”

New Project

Steps

1. Choose Project
2. Framework Selection
3. Project Settings
4. **Configuration Settings**

Configuration Settings

Name: default

Device Family: WBZ Target Device: WB245

Device Filter:

Show Visual Help

< Back Next > Finish Cancel Help

9.2 Open “MPLAB Code Configurator” after creation of project



MCC content manager window will appear in IDE

9.3 Select “MPLAB Harmony” from the content manager window





MCC Content Manager Wizard

1. Content Type 2. Assign Device Content

Select a Content Type

MCC Melody

Supports the MCC Builder.
Supports content according to driver level.
An iteration of MCC; generated code
links both on- and off-chip.

Select MCC Melody

[Release notes and supported devices](#)

MCC Classic

Development process you are accustomed to.
All components and libraries that you have used before.

Select MCC Classic

[Release notes and supported devices](#)

MPLAB® Harmony

Embedded Software Development Framework for 32-bit
Microcontrollers and Microprocessors

Select MPLAB Harmony

[Release notes and supported devices](#)

Library support may be a key factor in your choice of MCC flavor:

> MCC Melody and MCC Classic - Library Summary

> MPLAB Harmony - Library Summary

Still unsure which content type is right for your project?

[See More Details](#)





Optional Content

Select optional content to be made available in Device Resources for selection

Optional Content		
Component	TI	Version
> <input type="checkbox"/> Harmony Bootloader		
> <input type="checkbox"/> Harmony Chip Support Package		
> <input type="checkbox"/> Harmony Networking Stack and Solutions		
> <input type="checkbox"/> Harmony USB solutions		
▼ <input checked="" type="checkbox"/> Harmony Core		
<input checked="" type="checkbox"/> bsp		3.0.0
<input checked="" type="checkbox"/> core		3.0.0
<input checked="" type="checkbox"/> zlib		1.2.11
▼ <input checked="" type="checkbox"/> Harmony Cryptography solutions		
<input checked="" type="checkbox"/> crypto		3.0.0
<input type="checkbox"/> crypto_apps_encrypt_decrypt		3.0.0
<input type="checkbox"/> crypto_apps_large_hash		3.0.0
<input type="checkbox"/> crypto_apps_speed_test		3.0.0
> <input type="checkbox"/> Harmony Aerospace solutions		
> <input type="checkbox"/> Harmony Graphics (Aria) solutions		
> <input type="checkbox"/> Harmony CryptoAuthLib solutions		
> <input type="checkbox"/> arm Mbed OS		
> <input type="checkbox"/> Harmony Capacitive Touch solutions		
> <input type="checkbox"/> Harmony I2C/I2S solutions		
> <input type="checkbox"/> Harmony AWS solutions		
▼ <input checked="" type="checkbox"/> Harmony WolfSSL solutions		
<input type="checkbox"/> wolfMQTT		2.10.0
<input type="checkbox"/> wolfssh		2.10.0
<input checked="" type="checkbox"/> wolfssl		2.10.0
> <input type="checkbox"/> X2C for Harmony		
▼ <input checked="" type="checkbox"/> CMSIS FreeRTOS		
<input checked="" type="checkbox"/> CMSIS-FreeRTOS		2.10.0

Note: Versions selected in the images may not be the latest,
Ensure all components are selected as displayed below





MCC Content Manager Wizard

1. Content Type 2. Required Device Content **Finish**

Required Content

Some required content must be downloaded. The following content will be downloaded when you click on "Finish".
To change content versions later, access the Content Manager from Device Resources.

Required Content				
Component	TI	Version	Update progress	Description
Harmony Chip Support Package				
csp		3.12.0		
dev_packs		3.12.0		
Harmony Tools				
mhc		3.8.5		
Harmony Core				
bsp		3.12.0		
core		3.10.0		
zlib		1.2.11		
Harmony reference material				
quick_docs		1.4.0		
Harmony Cryptography solutions				
crypto		3.7.5		
Harmony WolfSSL solutions				
wolfssl		4.7.0		
CMSIS FreeRTOS				
CMSIS-FreeRTOS		10.3.1		

Select "Finish" The downloading of selected components from harmony repositories will take some minutes.

If all the selected components are cloned successfully, MCC logs in IDE will display this information

```
Output x Search Results x MPLAB® Code Configurator x MCC Log x
21:55:43.015 INFO: Available content:
Device provider: (CLASSIC) com.microchip.mcc.harmony.Harmony3Library 1.0.3 @ C:\Users\cl7143\mcc\libraries\harmony3library-1.0.3.mc3lib
Content mode: HARMONY
Content:
(CLASSIC) com.microchip.mcc.harmony.Harmony3Library 1.0.3 @ C:\Users\cl7143\mcc\libraries\harmony3library-1.0.3.mc3lib
(HARMONY) CMSIS-FreeRTOS 10.3.1 @ C:\mchp\CMSIS-FreeRTOS
(HARMONY) bsp 3.10.0 @ C:\mchp\bsp
(HARMONY) core 3.10.0 @ C:\mchp\core
(HARMONY) crypto 3.7.5 @ C:\mchp\crypto
(HARMONY) csp 3.10.0 @ C:\mchp\csp
(HARMONY) dev_packs 3.10.0 @ C:\mchp\dev_packs
(HARMONY) mhc 3.8.2 @ C:\mchp\mhc
(HARMONY) quick_docs 1.4.0 @ C:\mchp\quick_docs
(HARMONY) wolfssl 4.7.0 @ C:\mchp\wolfssl
(HARMONY) zlib 1.2.11 @ C:\mchp\zlib
21:55:43.066 INFO: Adding library com.microchip.mcc.harmony.Harmony3Library v1.0.3
21:55:43.070 INFO: Loading libraries : Start
21:55:43.078 INFO: Adding library com.microchip.mcc.harmony.Harmony3Library v1.0.3
21:55:43.187 INFO: Loading library "com.microchip.mcc.harmony.Harmony3Library", version 1.0.3, revision unknown, built from core version 5.3.0-melody-test-q.
21:55:43.198 INFO: Loading libraries : Success
```

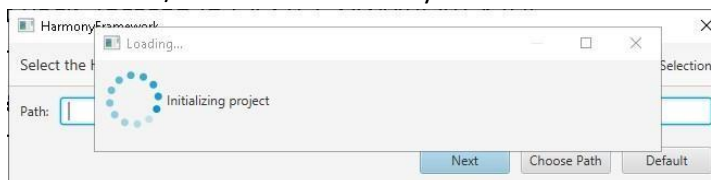
If in the process a failure to download a particular component appears, try redownloading again only the component that failed to download.

For example, if user received a prompt from MCC saying "dev_packs" was not download, close the MCC reopen MCC again and start from step 3, with the "dev_packs" as the only missing component for downloading and select "Finish"





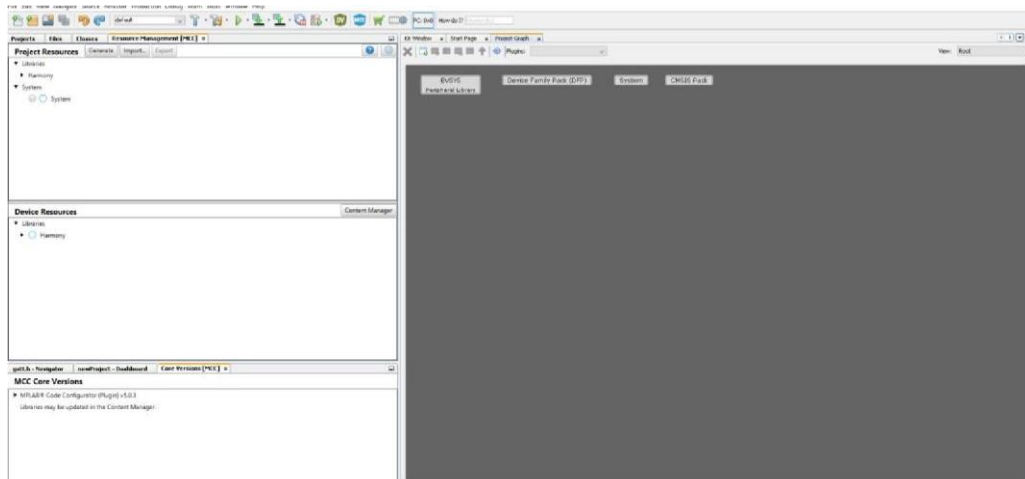
10. Select/Confirm the Harmony Framework Path



Note: Framework Path selection window appears beneath the Initializing Project pop-up, users should Choose Path as “C:\mchp”



Project Graph Window will appear after choosing the framework path and successful initialization of project



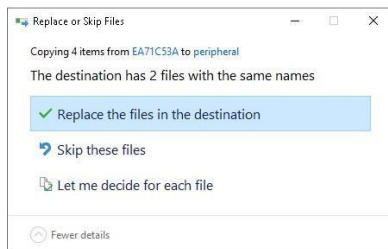
11. Ensure content versions as chosen based on the table below - using the content manager from Device Resources and select “Apply”





▼ Harmony Chip Support Package				
① csp	3.12.0 ▼	Latest		
▼ Harmony Core				
① core	3.10.0 ▼	Latest		
▼ Harmony Tools				
① mhc	3.8.5 ▼	Latest		
① bsp	3.12.0 ▼	Latest		
▼ Harmony Cryptography solutions				
① crypto	3.7.5 ▼	Latest		
① crypto_apps_encrypt_decrypt	- ▼	Available		
① crypto_apps_large_hash	- ▼	Available		
① crypto_apps_speed_test	- ▼	Available		
① harmony-services	1.1.0 ▼	Latest		
▼ MCC Harmony Core				
① com.microchip.mcc.harmony.Harmony3Library	1.1.1 ▼	Latest		Communicates with the MCC core, providing views and other functionality for MCC Harmony
> Harmony Capacitive Touch solutions				
> Harmony I2C solutions				
> Harmony I2S solutions				
> Harmony TensorFlow Lite for Microcontroller (TFLM) Solutions				
▼ Harmony WolfSSL solutions				
① wolfMQTT	- ▼	Available		
① wolfSSH	- ▼	Available		
① wolfSSL	4.7.0 ▼	Latest		
> X2C for Harmony				
▼ CMSIS FreeRTOS				
① CMSIS-FreeRTOS	10.3.1 ▼	Latest		
① zlib	1.2.11 ▼	Latest		
① dev_packs	3.12.0 ▼	Latest		

12. Copy the “clk_pic32cx_bz” folder located in “EA71C53A\” folder to “C:\mchp\csp\peripheral” folder, A prompt will appear warning destination has same file names - Select "Replace the file in the destination".



13. Copy all the 3 folders titled “wireless_” located in “EA71C53A\H3” to “C:\mchp”
Here is an example of how the folder should look like after copying the “wireless_” folders



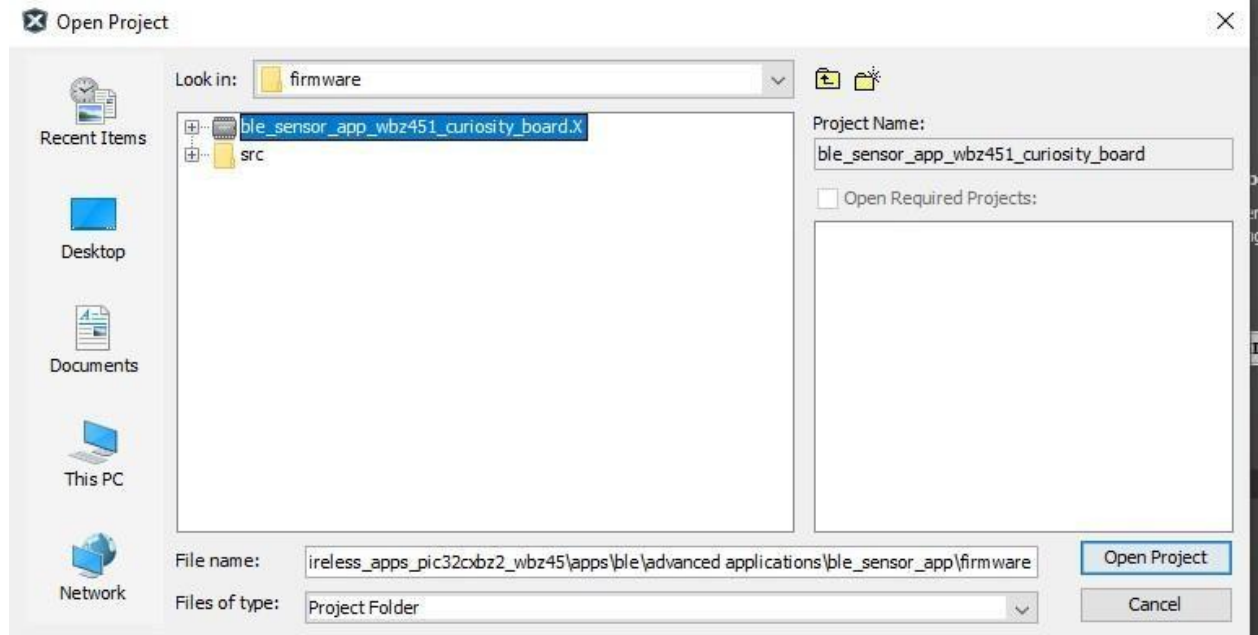


> This PC > Local Disk (C:) > mchp			
Name	Date modified	Type	
zlib	5/3/2022 8:30 PM	File folder	
wolfssl	5/3/2022 8:37 PM	File folder	
wireless_system_pic32cxbz_wbz	5/3/2022 8:43 PM	File folder	
wireless_apps_pic32cxbz2_wbz45	5/3/2022 8:42 PM	File folder	
wireless	5/3/2022 8:44 PM	File folder	
quick_docs	5/3/2022 8:31 PM	File folder	
mhc	5/3/2022 8:31 PM	File folder	
harmony-services	5/3/2022 8:30 PM	File folder	
Devices	5/3/2022 8:24 PM	File folder	
dev_packs	5/3/2022 8:54 PM	File folder	
csp	5/3/2022 8:38 PM	File folder	
crypto	5/3/2022 8:31 PM	File folder	
core	5/3/2022 8:33 PM	File folder	
content_manager_artifacts	5/3/2022 8:25 PM	File folder	
CMSIS-FreeRTOS	5/3/2022 8:43 PM	File folder	
bsp	5/3/2022 8:30 PM	File folder	

Next Steps

14. Open existing application examples/ develop a new application – visit -
mchp\wireless_apps_pic32cxbz2_wbz45\apps\
 15. How to open, build and program an existing application example
- Pre-requisites:** Complete steps 1-11
- 15.1 Connect Curiosity Board to the PC using usb cable
 - 15.2 Open MPLAB IDE
 - 15.3 Select **File > Open Project**
 - 15.4 Select the project from C:\mchp\wireless_apps_pic32cxbz2_wbz45\apps\ble\advanced applications\ble_sensor_app\firmware
 - 15.4.1 If user has multiple projects open, select the ble_sensor project, Right click and set the project as “Set as Main Project”





Information related to the workings of the application example are available in readme.md file available in the ble_sensor_app folder or Getting Started html

15.5 Open Project Properties

15.5.1 Select WBZ451 Curiosity Board as hardware tool for programming

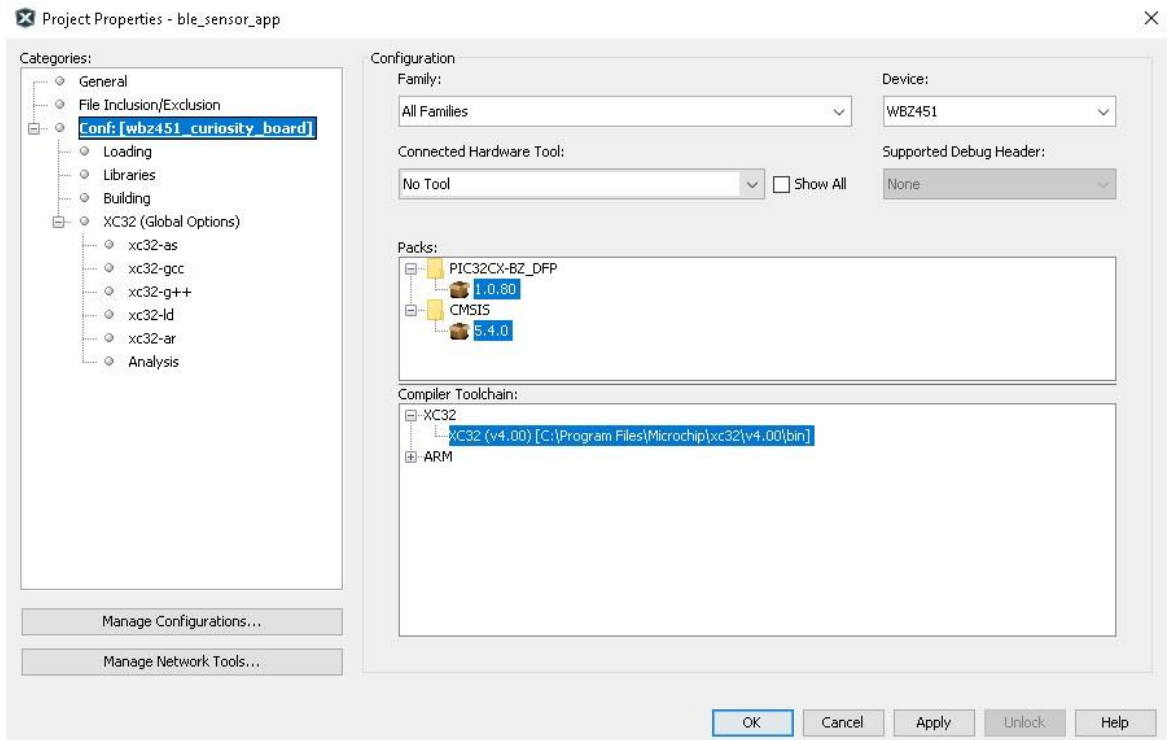
15.5.2 Ensure DFP v1.0.xx is selected and CMSIS v5.4.0

Note: DFP version should match the version mentioned in table 1

15.5.3 select XC32 v4.00 compiler (in case user has several versions of XC32 compilers installed)

Note: Compiler version should match the version mentioned in table 1





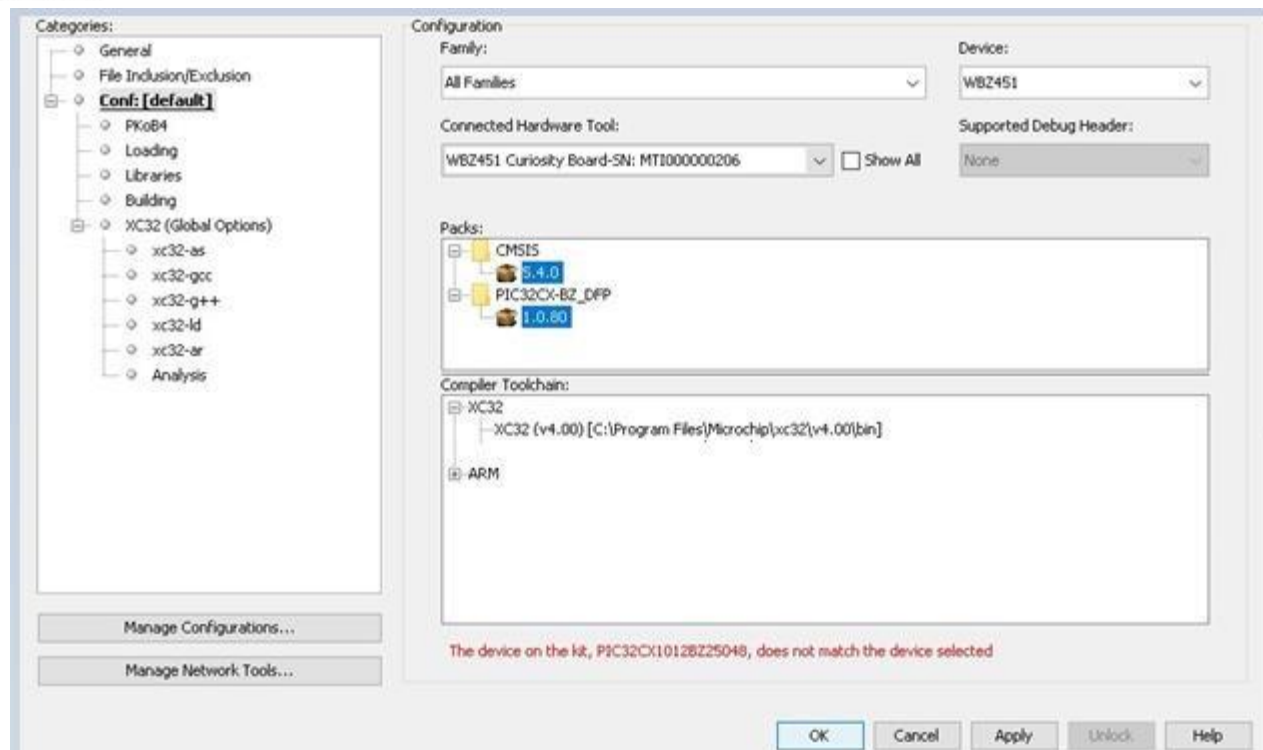
- 15.6 Select option **Build Project** in IDE to compile the application example



Build Project

- 15.7 Plug the Curiosity Development board to PC using usb cable
- 15.8 Select the “Connected Hardware Tool” in properties and Select “Apply”





Note: The message in red can be ignored as the project built for WBZ451 will directly run on the Curiosity board. WBZ451 is an RF module based of PIC32CX1012BZ25048 Soc

- 15.9 Select option **Run Project** in IDE to program the target – the onboard debugger will program the example application

Run Project

Note: A smartphone App might be needed to explore the full feature set of Application examples, users can refer to readme.md (markdown reader recommended) available in respective Application Example folder or Getting Started html points to the instructions of the Application example

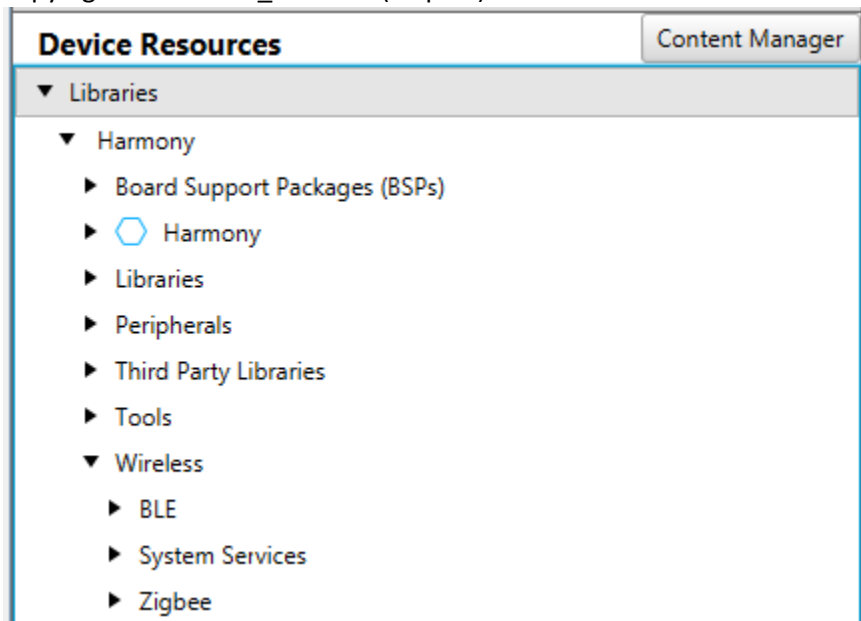
Troubleshooting

1. If users see warning saying – “Project’s device is not supported by the currently loaded libraries”, uninstall MCC plugin from IDE-> step 6 – delete the. mcc folder -> Step 7- Install the MCC plugin again





2. If users cannot view the BLE stack/ BLE System services in the Device Resources, user's must have missed copying the "wireless_" folders (step 13) to the framework folder



3. If users cannot open the MCC configurator for a precompiled app example as part of this package, user's must have missed copying the "wireless_" folders (step 13) to the framework folder
4. If low power consumption is not observed as documented in the example user guide, user's should check if step 12 (copy "clk_pic32cx_bz") was completed and also should check the known issues.pdf document in /Documentation/ folder