



congatec Application Note #35

Affected Products	Products featuring AptioV UEFI Firmware
Subject	OEM Setup Modification
Confidential/Public	public
Author	CJR

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Revision History

Revision	Date (yyyy-mm-dd)	Author	Changes
1.0	2016-10-07	CJR	Initial release of document

Preface

This Application Note is intended to explain how the congatec Embedded BIOS setup program can be customized and adapted to the requirements of a particular application. The customization of the BIOS Setup program can be done using the congatec System Utility tool (CGUTIL) in combination with the new congatec utility CgMIfEditor.exe.

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Symbols

The following are symbols used in this application note.



Notes call attention to important information that should be observed.



Caution

Cautions warn the user about how to prevent damage to hardware or loss of data.



Warning

Warnings indicate that personal injury can occur if the information is not observed.

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Terminology

Term	Description
UEFI	Unified Extensible Firmware Interface
AMI	American Megatrends, Inc - congatec's BIOS partner
Aptio V	AMIs next generation UEFI BIOS
MLF	Menu Layout File

1 Introduction

Allowing full access to the BIOS Setup could lead to the risk that the end user can change BIOS settings that may negatively affect the systems functionality or even cause the system to no longer boot. One solution to avoid this is to secure the Setup with a BIOS password. With this solution the user access to the BIOS Setup can be completely blocked.

A more efficient solution is to customize the BIOS Setup program so that the user can only change settings that are not critical to the functionality of the complete system. That means that the end user will be allowed to have access to the BIOS Setup program but the settings that they are not allowed to change will be either not visible to them or grayed out. They will only have access to the settings that they can change that will not jeopardize the system's functionality. BIOS Setup program customization can be done using the congatec System Utility tool (CGUTIL). The following sections will describe how this can be done using the Windows GUI version of the CGUTIL tool. This function is not supported by the command line version of the CGUTIL tool (CGUTLCMD).

For detailed information about the congatec System Utility consult the CGUTIL User's Guide. This can be found on the congatec website (<u>www.congatec.com</u>).

With OEM setup modification support you are able to show, hide, gray-out a given setup node and change its title and help text. It is not possible to change the default settings or change the options of a particular setup node.

Refer to the congatec AN8_Create_OEM_Default_Map.pdf to learn how to change the default settings of a congatec embedded BIOS.

2 **Requirements**

OEM setup modification requires a congatec embedded BIOS based on AMIs Aptio V UEFI firmware implementation. Only BIOS releases after mid of 2016 may have the support built-in. One can check if the BIOS supports OEM setup modification by looking at the *Save & Exit* setup submenu. There must be an option for saving the current Setup Layout file by the item *Generate Menu Layout File*. See picture 1 below.

In addition to the BIOS support, two utilities are required:

- congatec system utility CGUTIL revision 1.5.6 or later
- congatec setup menu layout editor CgMlfEditor.exe

Both utilities can be downloaded from the congatec website at <u>www.congatec.com</u> and are available for Windows and Linux.



The congatec setup menu layout editor CgMlfEditor.exe is also integrated in the CGUTIL 1.5.6 GUI version. See picture 3 below. Selecting the BIOS Setup Configuration button launches CgMlfEditor.exe.

BIOS setup configuration is only supported in BIOS File operation target. It does not work with Board (CGOS) operation target.

3 OEM Setup Configuration – step by step

3.1 Generation of the MLF

The first step is to save the MLF (menu layout file) of the BIOS version you want to change. To do so, simply boot the congatec product using an attached boot device that has a writable file system (i.e. USB stick) and then enter BIOS setup. Go to the *Save & Exit* submenu and select the *Generate Menu Layout File* node. The MLF will be stored on the file system.

Aptio Setup Utility – Copyright (C) 2016 American Main Advanced Chipset Security Boot Save & Exit	Megatrends, Inc.
Save Options Save Changes and Exit Discard Changes and Exit	Menu layout file will be generated and stored on the first writable file system found
Save Changes and Reset Discard Changes and Reset	
Save Changes Discard Changes	
Default Options Restore Defaults Save as User Defaults	
Restore User Defaults	↔: Select Screen ↑↓: Select Item
▶ Generate Menu Layout File	Enter: Select +/−: Change Opt. F1: General Help
	F2: Previous Values F9: Optimized Defaults
	F10: Save & Exit ESC: Exit
Version 2.18.1259. Copyright (C) 2016 American M Picture 1: Save & Exit setup sub menu of a BIOS supporting OF	egatrends, Inc. M setup configuration

🗩 Note

The saved MLF can only be used for the BIOS version it was taken from. With future BIOS versions new MFL files have to be generated.

3.2 Modify the MLF

Use the congatec setup menu layout editor **CgMlfEditor.exe** on your development PC to modify the previously stored MLF to meet your needs. Open the previously created MLF file and make all your changes as explained below and then save the MLF under a new name, e.g. myBQSLR009.mlf.

congatec Menu Layout File Editor 1.0.0 - BQSLR009.mlf Compatible B	BIOS version: BQSLR	009
<u>F</u> ile <u>H</u> elp		
Item tree	Item settings	
▲ Setup	Type:	Popup selection
▷ Main	Original condition:	Visible
Advanced	Override condition:	Visible R
Chipset	Original item text:	
A Chipset		
Processor (Integrated Components)	Override item text:	DMI LINK ASPM Processor Side
Platform Controller Hub (PCH)	Original help text:	
Intel PCH RC Version	Active State Power	Management (ASPM) of the DMI link on the Processor side.
Intel PCH SKU Name		
Intel PCH Rev ID		
Isolate SMBus Segments		
CF9h Global Reset		
PCI Express Configuration		
PCI Express Configuration	Override help text:	R
PCI Express Configuration		
PCI Express Clock Gating	Active State Power DMI link is the mai	r Management (ASPM) of the DMI link on the Processor side. n bus between the Processor and Platform Controller Hub (PCH).
Divit LITIK ASPIVI Processor Side		
Port8xh Decode Port#		
Peer Memory Write Enable		
Compliance Test Mode		
PCIe-USB Glitch W/A		
0	pen MLF file	
S	ave MLF file	

Picture 2: cgMlfEditer Main Menu with a MLF file named BQSLR009.mlf opened

3.2.1 Item Tree

On the left side the cgMlfEditor shows the setup menu layout in a tree view. Use this tree to navigate to the setup item you want to modify. Note that in this tree view you can also see setup items that were not visible in the congatec embedded BIOS the MLF file was generated with. These setup items were hidden by either AMI or congatec already. Although the cgMlfEditor utility allows you to do so, you should not make such setup items visible. Also note that the setup submenus are listed twice in the item tree. This is only a cosmetic display issue and has no functional impact.

3.2.2 System Settings

On the right side the cgMlfEditor shows the settings of the selected setup item. The type field shows the type of setup node. The possible types are Popup selection and Numeric value for setup item and Text, Memo, SubMenu and Page for simple strings. The type field is just an information field that cannot be changed.

Underneath the type field are 3 pairs of settings that allow you to modify the setup item:

- *Condition* (Visible, Suppressed, Hidden, Grayed Out, Unknown) provides the ability to modify the visibility of a setup item.
- *Item text* provides the ability to modify the prompt text for the setup item.
- *Help text* provides the ability to modify the help text for the setup item.

The original setting, for all three changeable setup item properties, is also displayed and provides the ability to always return back to the original setting.



3.3 Generate an OEM BIOS module from the MLF

Run the CGUTIL GUI version 1.5.6 or later on your development PC.

BIOS File		
C Board (CGOS)		
C EPI File Only	congatec	Select Input BIOS File
	1	
BIOS Module Mod	ification	Panel Configuration
BIOS Setup Config	guration	BIOS/Board Information
BIOS Updat	e	Firmware Update

Select Operational Target *BIOS File* and the BIOS version you used to create the MLF as *Input BIOS File*. CGUTIL then prompts you for the file name of the new BIOS you are going to create. Let's name the BIOS OEM1R009.BIN for this example. In the next step select the *BIOS Module Modification* submenu.

Current BIOS Modules: EPI Panel Data, ID: FFFFh			Add Module	Save Module Data To File
			Delete Module	Save Module Overview
Free: 0x2EEA0 Bytes		Sav	e Module To File	Create Module
Module Parameters				
Module Type	Module ID		Module Revision	Module Size (auto)
EPI Panel Data 👻	FFFFh		01h	00001134h
Load Time	Execution Time		Load Address	Entry Offset
NONE	NONE	Ŧ	FFFFFFFh	00000000h
			. 1	
		0		Annha

Continue with *Create Module*, select the previously saved myBQSLR009.mlf as input file for the new BIOS module and select module type *OEM Setup Menu Control*.

candard BIOS Version: BQSLN	09 OEM BIOS Versio	on:	Deactivate BIOS Write Protection
Current BIOS Modules: EPI Panel Data, ID: FFFFh		Add Module	Save Module Data To File
		Delete Module	Save Module Overview
Free: 0x2EEA0 Bytes		Seve Module To File	Create Module
Module Parameters			
Module Type	Module ID	Module Revision	Module Size (auto)
CMOS Default Map 💌	0000h	00h	00000000h
POST Logo Right	Execution Time	Load Address	Entry Offset
OA 3.0 Module OEM Setup Menu Control OEM SMBIOS Data	NONE	v 00000000h	0000000h
	Use the module para When done, click 'Create Moo 'Cancel' will abort all op	meter fields to configure the new moduli dule' again to generate and save the ner erations and switch back to standard m	e. w module. ode.
	Use the module para When done, click 'Create Moo 'Cancel' will abort all op	meter fields to configure the new moduli Jule' again to generate and save the ner erations and switch back to standard m	e. w module. ode.

Picture 5: Create OEM Setup Menu Control BIOS module

Select *Create Module* again to save the new BIOS module. Name it, for example, myBQSLR009mlf.mod.



3.4 Add the OEM Setup Menu Control module to the BIOS

The last step is to add the previously created OEM Setup Menu Control module to the BIOS. Use the *Add Module* button

Idard DIUS Version: BUSLIN	09 DEM BIOS Version:		Deactivate BIOS Write Protection
urrent BIOS Modules: Pi Panel Data, ID: FFFFh		Add Module	Save Module Data To File
		Delete Module	Save Module Overview
ee: 0x2EEA0 Bytes		Save Module To File	Create Module
odule Parameters			
Module Type	Module ID	Module Revision	Module Size (auto)
EPI Panel Data 👻	FFFFh	01h	00001134h
Load Time	Execution Time	Load Address	Entry Offset
NONE	NONE	FFFFFFFh	00000000h
Close		Cancel	Арр

and pick the BIOS module file.

Open BIOS Mod	dule File			_	X
Look in:	NewBIOS		• +	🗈 💣 🔳 🔻	
Recent Places	myBQSLR009n	lf.mod			
Desktop Desktop Libraries Computer Computer					
	File name:	myBQSLR009mlf.mod		•	<u>O</u> pen
	Files of type:	(*.mod)		•	Cancel

Picture 7: Add the new Module

At the end double check that the OEM Setup Menu Control module is in the list of *Current BIOS modules,* assign an *OEM BIOS version* and *Apply* the changes. CGUTIL will the save the OEM BIOS file.

Current BIOS Modules:		Add Module	Save Module Data To File
EPI Panel Data, ID: FFFFh OEM Setup Menu Control, ID: 0h			
		Delete Module	Save Module Overview
		Save Module To File	Create Module
Free: 0x2EE58 Bytes			
Module Parameters			
Module Type	Module ID	Module Revision	Module Size (auto)
OEM Setup Menu Control 🛛 👻	0000h	00h	00000048h
Load Time	Execution Time	Load Address	Entry Offset
NONE	NONE	▼ 4C535142h	39303052h
	Press 'Apply' to apply change	s to the operation target or 'Cancel' to	o undo.

Congratulations, you just created a BIOS with a customized BIOS setup program.