

Aptio 5.x AMISCE User Guide

AMI SOFTWARE UTILITY USER GUIDE

REVISION 1.86 – JULY 25, 2024

NDA REQUIRED

Aptio 5.x AMISCE User Guide

© Copyright 2024 AMI.

All rights reserved.

ami.com

This publication contains proprietary information that is protected by copyright. No part of this publication can be reproduced, transcribed, stored in a retrieval system, translated into any language or computer language, or transmitted in any form whatsoever without the prior written consent of the publisher, AMI.

All trademarks and trade names used in this document refer to either the entities claiming the marks and names or their products. AMI. disclaims any proprietary interest in trademarks and trade names other than its own.

Revision History

Date	Rev	Description of Changes
2009-09-09	0.10	Initial document created
2009-10-07	0.11	Document updated to provide windows OS support
2010-02-18	0.12	Document updated to include Windows 7 OS support
2010-03-05	0.13	Document updated with Advanced script File support
2010-04-07	0.14	Updated title page, header, document properties, features, and user interface.
2010-05-04	0.15	Add DOS SCE
2010-05-11	0.16	Added a note about '/f' option.
2010-06-08	0.17	Addressed Style Issues and updated content
2010-08-16	0.18	/u support clarified
2010-08-27	0.19	Removed /u option, clarified BIOS and Linux requirements
2010-09-02	0.20	Added exe name for all AMISCE version
2010-09-21	0.21	Updated the document with Password Encryption
2010-10-19	0.21	Fixed review comments
2010-10-26	0.21	Removed reference to UQI from AMISCE features
2010-12-22	0.21	Updated the document for Standards Review
2011-01-11	0.22	Added example for changing Password without providing a Variable
2011-01-12	0.23	Added description for manipulating NVRAM variables
2011-02-10	0.24	Add errors and warnings description to appendix
2011-03-14	0.25	Added note for basic intended use case
2011-04-06	1.01	Update for version 2.01
2011-07-21	1.02	Updated according to document standards.
2012-04-05	1.03	User password. BIOS requirements.
2012-07-30	1.04	APTIO V support
2012-10-04	1.05	Updated for release 2.02.1035ALPHA.
2012-12-17	1.06	Updated for adding /m support in SCEDOS.

2013-02-04	1.07	Add example of subtitle comment. Update and correct “Errors and Warnings”. Change references to AFU to SCE in Linux driver section.
2013-03-25	1.08	Updated for adding /b support.
2013-06-07	1.09	Updated for adding /r support.
2013-06-15	1.10	Updated Question Evaluation support.
2013-06-21	1.11	Updated for mapping language support.
2013-07-18	1.12	Updated Instructions on using AMISCE.
2013-08-05	1.13	Updated for /sp and /g support.
2013-10-11	1.14	Updated for 5.00.1048 release.
2013-12-19	1.15	Updated With Creation of New NVRAM Variables.
2014-01-02	1.16	Updated supported OS list.
2014-01-16	1.17	Updated for provision to accept the mapping language.
2014-04-09	1.18	Updated the /a option in SCE to Enables Setup Question having Empty or Blank names to be exported in default export mode.
2014-04-23	1.19	Updated for Option /d - Skip checking for AptioV BIOS and behave normally.
2014-05-16	1.20	Added information regarding ‘NVRAM Variable Access Unlock’
2014-06-25	1.21	Update system requirements. Explain “Platform Identification Failed” error message.
2014-07-24	1.22	Explain warning message for string controls.
2014-07-28	1.23	Explain warning message for variable write.
2014-09-24	1.24	Updated feature list with features for 5.01 and added information on new features. Added SCE Exit Codes section. Updated BIOS requirements section.
2014-10-14	1.25	Updated document header.
2014-10-14	1.26	Updated a note regarding exporting dynamic setup page questions.
2014-12-15	1.27	ARM CPU support.
2015-01-29	1.28	Scan code and EFI key support.
2015-02-04	1.29	Minor clarifications and additions.
2015-05-04	1.30	SCE for ARM 64 EFI.
2015-10-13	1.31	Added information on single question update from command line.

2015-10-22	1.32	Updated single question update usage with more options.
2015-10-30	1.33	Updated information on numeric value format for single question update from command line.
2015-11-05	1.34	Added information on mapping language for single question update.
2015-12-01	1.35	Revised Error and Warning Messages.
2015-12-10	1.36	Updated for PLDM support.
2015-12-21	1.37	Review update.
2016-03-02	1.38	Updated copyright year.
2016-03-03	1.39	Documentation standards update.
2016-03-04	1.40	Fixed typos.
2016-03-04	1.41	Added information to disable boot option.
2016-03-04	1.42	Updated feature list.
2016-03-17	1.43	Added BIOS requirements for disable boot option support.
2016-03-29	1.44	Added steps to sign driver on RHEL 7.
2016-04-29	1.45	Updated information on disable boot option support when FixedBootOrder module present in BIOS.
2016-05-13	1.46	Updated for efivarstore variable type support.
2016-06-21	1.47	Updated supported operating systems
2016-07-01	1.48	Updated FBO label information.
2016-07-05	1.49	Updated table of contents.
2016-08-16	1.50	Updated supported operating systems
2016-10-06	1.51	Updated information to read single question from command line, to identify grayedout and suppressed forms and controls in script, to hide banner, to specify multiple mapping languages and to use negative numbers as values for setup questions.
2016-10-21	1.52	Updated /sp and /g behavior for duplicate questions.
2017-01-16	1.53	Updated feature list.
2017-05-29	1.54	Updated information on handling duplicate questions.
2017-08-28	1.55	Updated information on verifying flash driver in Windows.
2018-03-30	1.56	Modified SCE to prefer existing driver over using RuntimeMemoryHole
2018-05-15	1.57	Added information about /ni, /reboot and /shutdown switches

2018-05-20	1.58	Updated information about Linux driver in secure boot mode
2018-06-07	1.59	Updated information about Linux driver requirements
2018-09-06	1.60	Updated information on single question export of defaults
2018-11-25	1.61	Updated information for password through file support and BIOS requirements for date and time support
2018-12-17	1.62	Updated information on single variable update and /ni feature
2019-03-26	1.63	Linux driver file name changed to amiscedrv_mod.o
2019-08-20	1.64	Updated BIOS requirements, password information and removed unsupported OS.
2019-08-27	1.65	Updated usage information.
2019-08-29	1.66	Updated examples with help string support.
2019-09-19	1.67	Updated information on exit codes.
2019-11-29	1.68	Updated examples for order list controls.
2020-04-23	1.69	Added note for single question export and update command line feature.
2020-05-19	1.70	Updated examples for debug log support.
2020-06-15	1.71	Updated example for /opwd switch.
2020-08-03	1.72	Updated supported operating systems and feature list.
2020-08-12	1.73	Updated the supported operating systems.
2020-10-30	1.74	Updated example for script compare support.
2021-01-22	1.75	Copyright year update.
2021-03-22	1.76	Hii DB issue updated.
2021-06-18	1.77	Change the order of table of exit codes.
2021-07-09	1.78	Updated SCE Exit Codes section.
2022-02-23	1.79	Removed [option2] for /Gendrv command. Added support for Win11 and Windows server 2022. Modified the reference link for Linux Loadable Kernel Module HOWTO and Signing Driver on Linux and Enrolling Public Key to the System.
2022-03-15	1.80	Added Windows Aarch64(Arm64) support. Updated error code.
2022-06-17	1.81	Remove the Driver information for Windows 7
2023-03-08	1.82	Improve the description of section NVRAM Variable Access Unlock.

		Updated as per new template
2023-04-03	1.83	Reviewed the document format
2023-05-15	1.84	Fix typo in section NVRAM Variable Access Unlock.
2023-08-30	1.85	Improve the description of /lang command.
2024-07-25	1.86	Fix the list files of /gendrv command Update BIOS Configuration Requirement

Disclaimer

This publication could include technical inaccuracies or typographical errors. Changes are periodically made to the information herein; these changes will be incorporated in new editions of the publication. AMI may make improvements and/or revisions in the product(s) and/or the program(s) described in this publication at any time.

Requests for technical information about AMI products should be made to your AMI authorized reseller or marketing representative.

This publication contains proprietary information which is protected by copyright. No part of this publication may be reproduced, transcribed, stored in a retrieval system, translated into any language or computer language, or transmitted in any form whatsoever without the prior written consent of the publisher, American Megatrends International LLC. American Megatrends International LLC retains the right to update, change, modify this publication at any time, without notice.

For Additional Information

Call American Megatrends International LLC. at 1-800-828-9264 for additional information.

Limitations of Liability

In no event shall American Megatrends be held liable for any loss, expenses, or damages of any kind whatsoever, whether direct, indirect, incidental, or consequential, arising from the design or use of this product or the support materials provided with the product.

Limited Warranty

No warranties are made, either expressed or implied, with regard to the contents of this work, its merchantability, or fitness for a particular use. American Megatrends assumes no responsibility for errors and omissions or for the uses made of the material contained herein or reader decisions based on such use.

Trademark and Copyright Acknowledgments

Copyright © 2024 American Megatrends International LLC. All Rights Reserved.

American Megatrends International LLC

3095 Satellite Boulevard

Building 800, Suite 425

Duluth, GA 30096 (USA)

All product names used in this publication are for identification purposes only and are trademarks of their respective companies.

Table of Contents

1 Overview 1

1.1 What is AMISCE? 1

1.2 AMISCE Features 1

1.3 System Requirements 2

1.3.1 Supported Operating Systems 2

2 Interface Descriptions 3

2.1 User Interface 3

2.1.1 Command Line Interface 3

2.1.2 Default Mode Execution 3

2.1.3 Default Export Mode 3

2.1.4 Raw Mode Execution 6

2.1.5 Raw Export Mode 6

2.2 Updating NVRAM with Script File 6

2.2.1 Default Import Mode 6

2.2.2 Disable Boot Option 7

2.2.3 Raw Import Mode 8

2.2.4 NVRAM Variable Access Unlock 9

2.2.5 Change User/Admin Password 10

2.3 PLDM Support 12

2.3.1 PLDM Export 12

2.3.2 PLDM Import 12

2.4 Single Question Update from Command Line 13

2.4.1 Examples for Single Question Update 14

2.4.2 Disable Boot Option 15

2.5 Read Single Question from Command Line 15

2.5.1 Example to read Single Question Value from Command Line 16

2.6 Sample Report 16

2.6.1 Default Output with Verbose option 16

2.6.2 Raw Mode Outputs 18

2.7 Instructions on using AMISCE 19

2.7.1 Default Mode Usage (/s) 19

2.7.2 Raw Mode Usage (/n) 22

2.8 Creating a new NVRAM Variable 23

2.8.1 Steps to create a new variable in NVRAM: 23

2.9 Creating or Updating a NVRAM Variable from Command Line 23

2.9.1 Examples for Single Variable Update 24

2.9.2 Sample Output 25

2.10 SCE Import Password 25
2.11 Getting Debug Traces 25
2.11.1 Example to enable debug log support with single question export command 26
2.12 SCE Script Comparison 26
3 Appendix 27
3.1 Setting Passwords by Direct Update to Variables 27
3.1.1 Steps to setup a Password 27
3.2 BIOS Configuration Requirements 28
3.3 Error and Warning Messages 29
3.4 Linux/BSD Pre-Requisites (does not apply to ArmSceLnx) 30
3.4.1 REFERENCES 32
3.5 Signing Driver on Linux and Enrolling Public Key to the System 32
3.6 Driver Verification on Windows 36
3.7 Linux shows error when secure boot is enabled 36
3.8 Segmentation Fault when AMISCELNX is in kernel 3.14.40 with XEN 4.2.4 36
3.9 SCE Exit Codes 38



Document Information

Technical Support

AMI provides technical support only for AMI products licensed directly from AMI.

Web Site

We invite you to visit our website at ami.com .

Purpose

This document is intended to provide all the necessary information for using AMI Setup Control Environment (AMISCE) Tool.

Audience

The intended audiences are BIOS developers, Generic Chipset Porting Engineers, OEM Porting Engineers, and AMI OEM Customers.

Chapter 1

1 Overview

1.1 What is AMISCE?

AMI Setup Control Environment (AMISCE) is a command line tool available in both 32-bit and 64-bit flavors. AMISCE provides you an easy way to update NVRAM variables from within the EFI, Linux, or Windows based environment. The user can extract variables directly from the BIOS, and also allows the user to change settings using either a text editor or a setup program, and then update the BIOS. Each of these actions may take place on a different system.

AMISCE produces a script file that lists all setup questions on the system where AMISCE is running. The user can then modify the script file and use it as input to change the current NVRAM setup variables.

1.2 AMISCE Features

The AMISCE tool allows you to perform the following functions:

1. Reads NVRAM variables and HII database from BIOS at run time to create files that can be used as input to a setup emulation program. The NVRAM script file may be edited as text.
2. Loads the NVRAM script file created by above process and updates the target system's NVRAM.
3. Enables advanced scripting mode that presents data as setup questions and associated settings.
4. Enables advanced scripting mode to update setup question defaults.
5. Supports setup question matching based on Setup Mapping Language. This support will be available once Aptio core supports Setup Mapping Languages.
6. Provides Command line operation.
7. Supports APTIO V features.
8. Supports Setup Question Evaluation for UEFI 2.1 and above
9. Supports blocking of migration.
10. Supports to specify multiple mapping language.
11. Support to export only questions whose value is different from default.
12. Supports suppression of duplicate questions.
13. Unlocks protected variable update with administrator password.
14. Support to change user/admin password
15. Aptio V BIOS Identification.
16. Get SMI port from ACPI table
17. Support to allow raw import to change size of variable data
18. Supports managing duplicate/unmatched setup questions.
19. Support to export all questions and filter out questions with improper strings (also if no x-AMI entry).
20. Support to comment out duplication questions
21. Support for special controls and to implement string controls.
22. Supports Migration of Settings.
23. Boot order synchronization
24. Verbose mode for detailed generation of the script file.
25. Support for output subtitles as comments to SCE scripts
26. Support to show warnings when multiple questions share the same storage location
27. OFBD module password check support.
28. UEFI spec support

29. Build using Aptio V build environment in VeB
30. Support for UEFI Shell 1.x and 2.x.
31. ARM Support
32. Change question value from command line.
33. PLDM Support.
34. Support for efivarstore type variable.
35. Support for negative numbers as values for numeric controls.
36. Support to hide banner.
37. Support to read single question value and defaults from command line.
38. Support to identify suppressed and grayedout forms and controls in script file.
39. SMM communication support.
40. Support to indicate system modification made by AMISCE using a Nvram variable.
41. Support to reboot and shutdown the system after system modification.
42. Support for date and time controls.
43. Support to update/create NVRAM variable from command line.
44. Support to provide admin and user password through file.
45. Supports expression evaluation for options.
46. Support for Order list control export and import.
47. Support for displaying Trace messages
48. Supports Non-register based SW SMI interface
49. Supports Script comparison.

1.3 System Requirements

1.3.1 Supported Operating Systems

AMISCE is supported by the following operating systems:

- EFI Shell Environment
- Microsoft Windows® 8
- Microsoft Windows® 8.1
- Microsoft Windows® 10
- Microsoft Windows® 11
- Microsoft Windows® Server 2019
- Microsoft Windows® Server 2022
- Microsoft Windows® PE
- Linux

***Note**: AMISCE is no longer supported in MS-DOS. Starting From Microsoft Windows® 7 in all the Windows Operating System the Application requires Administrator privileges to be executed and the command box is opened with Run as Administrator option.*

***Note**: For accessing Windows, Linux versions refer the steps outlined in Appendix section.*

Chapter 2

2 Interface Descriptions

2.1 User Interface

The user has to execute the following command lines in command prompt to run AMISCE.

2.1.1 Command Line Interface

***Note**: In the examples given below, "AMISCE" should be replaced with the correct OS specific version name from the following list:*

- *For WIN 32 utilize SCEWIN*
- *For WIN 64 utilize SCEWIN_64*
- *For WIN ARM 64 utilize SceWinArm.exe*
- *For LINUX 32 utilize SCELNX_32*
- *For LINUX 64 utilize SCELNX_64*
- *For LINUX ARM 64 utilize SceLnxArm*
- *For EFI 32 utilize SCEEFI.EFI*
- *For EFI 64 utilize SCEEFI64.EFI*
- *For EFI ARM 64 utilize SceEfiArm*

2.1.2 Default Mode Execution

The default mode of execution provides the ability to export and import NVRAM setting values for BIOS setup controls using a script. It can optionally generate the HII dump file.

2.1.3 Default Export Mode

To enable the default mode execution execute the command line

```
AMISCE /o /s <Setup Script File> [/h <HII Dump File>] [/sd <Duplicate Question
Script File>] [/b] [/v] [/lang <Lang Code1,Langcode2,LangcodeN>] [/sp] [/g] [/a]
[/d] [/q] [/ndef] [/ce] [/hb]
```

Where,

/o → Indicates generate Setup script file form HII data

/s → Indicates Setup script file that is to be generated.

[/h] → Indicates the HII Dump File, it is an optional feature, where this valid only while generating Setup script file

[/v] → Optional CMD line that produces a verbose script file

[/b] → Optional CMD line option that enables export of boot order controls in the generated script file.

[/lang] → Optional CMD line option that enables mapping language mode which will export questions with the specified lang codes. Lang Code indicates the code for a particular languages like for English(en-US), AMI(x-AMI) etc.

***Note**: Although mapping language mode supports multiple languages, the output script file supports English only.*

[/sp] → Optional CMD line option that enables Expression Evaluation for Suppressif Opcode.

[/g] → Optional CMD line option that enables Expression Evaluation for Grayoutif Opcode.

[/a] → Optional command line option that enables setup question having empty or blank names to be exported.

[/d] → Optional command line option to Skip checking for AptioV BIOS and behave normally

[/ndef] → Optional command line option to export only those questions whose value is different from the default.

[/sd] → Optional command line option to export duplicate questions in to a separate script file.

[/ce] → Optional command line option to specify with /sp and/or /g which comment out suppressif and grayoutif setup questions and forms.

[/hb] → Optional command line option to hide the tool information banner.

The user may optionally give the /q option to suppress all warning messages.

***Note**: The user has to use SCEWIN as windows executable command, but while using LINUX the executable command will be SCELNX. Numeric questions with decimal value(including negative values) will be mentioned inside angular brackets.*

Handling Duplicate Questions

SCE considers questions with the same storage location as duplicates. By default, these duplicates will be exported to the main script file but will be commented out. To export the duplicates into a separate script file, use the '/sd' option.

SCE won't import commented out questions, It will treat commented out questions as it doesn't exist in script. To import a commented out question, user have to remove the comment out symbols "//" and then import as shown below.

Example of commented out question,

```
// Setup Question = S/W Error Injection Support
// Help String    = S/W Error Injection Support Enable or Disable.
// Token    =400  // Do NOT change this line
// Offset   =90
// Width    =01
// BIOS Default =[00]Disable
// MFG Default =[00]Disable
// Options  =*[00]Disable     // Move "*" to the desired Option
//          [01]Enable
```

To import the commented out question, change it as shown below and then import.

```
Setup Question    = S/W Error Injection Support
Help String = S/W Error Injection Support Enable or Disable.
Token =400  // Do NOT change this line
Offset      =90
Width =01
BIOS Default =[00]Disable
MFG Default =[00]Disable
Options     =*[00]Disable     // Move "*" to the desired Option
        [01]Enable
```

***Note**: Questions in dynamic pages may not be available in exported script until these controls are exposed by the BIOS module. The module may expose controls/forms based on specific conditions.*

Questions which are inside suppressif or grayoutif conditions only will be removed from script for /sp or /g command respectively, when /ce switch is not mentioned. Duplicate instances of the same questions which are not inside suppressif or grayoutif conditions will not be removed.

Handling suppressed and grayedout controls and forms

SCE indicates forms and setup questions present inside suppressif and grayoutif conditions. These questions will be exported to the main script in commented form when '/ce' option is mentioned with /sp and/or /g option. An illustration of forms and controls inside grayoutif and suppressif conditions is shown below.

The command used here is the combination of all three /sp, /g and /ce.

Example: AMISCE /o /s script.txt /sp /g /ce

```
// SUPPRESS FORM

// SUPPRESS
// Setup Question =   Test1
// Help String    = Enable or Disable control.
// Token    =40   // Do NOT change this line
// Offset   =02
// Width    =01
// BIOS Default   =[01]Enabled
// Options  =[00]Disabled     // Move "*" to the desired Option
//         *[01]Enabled
// ENDOF SUPPRESS

// Setup Question = Test2
// Help String    = Enable or Disable control.
// Token    =51   // Do NOT change this line
// Offset   =22
// Width    =01
// BIOS Default   =[01]Enabled
// Options  =[00]Disabled     // Move "*" to the desired Option
//         *[01]Enabled

// GRAYOUT
// Setup Question = Test3
// Help String    = Enable or Disable control.
// Token    =271B // Do NOT change this line
// Offset   =48B
// Width    =01
// BIOS Default   =14
// Value    =21
// ENDOF GRAYOUT

// ENDOF SUPPRESSED FORM

// GRAYOUT FORM

// Setup Question = Test4
// Help String    = Enable or Disable control.
// Token    =33F  // Do NOT change this line
// Offset   =F3E
// Width    =01
// BIOS Default   =[00]None
```

```
// Options  =*[00]None  // Move "*" to the desired Option
//          [01]Option1
//          [02]Option2

// ENDOF GRAYEDOUT FORM
```

As shown above, if a form is present under grayoutif or suppressif, the controls present in that form will be shown in commented form.

2.1.4 Raw Mode Execution

AMISCE raw mode execution can export and import all NVRAM variables, including those not used for setup purposes. It also generates the listing file and HII dump file.

2.1.5 Raw Export Mode

```
AMISCE /o [/c] /l <listing file> /n <NVRAM Dump File> /h <HII dump file> [/d] [/hb]
```

Where,

/o →Indicates NVRAM script file to generate for Variables found in Listing File

/l → Indicates Variable Listing File

[/c] → Optional, Creates Variable Listing File containing information about all the variables found in NVRAM

Where,

With /c option, all variables names are output to the listing file, and all variables are output to the NVRAM dump script.

Without /c option, the listing file serves as a filter and the program provides output only to those variables with names present in the listing file. If the listing file is not present then it will result in error.

/n → Indicates NVRAM Dump File

/h → Indicates HII Dump File. This option is valid only when generating NVRAM script file and should always be used along with the /n option.

[/d]] → Optional command line option to Skip checking for AptioV BIOS and behave normally

[/hb] → Optional command line option to hide the tool information banner.

2.2 Updating NVRAM with Script File

Updating the NVRAM variables associated with setup questions can be achieved using the following commands

2.2.1 Default Import Mode

```
AMISCE /i [/cpwd | /cpwds | /cpwde <admin password> | /cpwdf |/cpwdef | /cpwdsf
<File having Current Admin Password>] /s <Setup Script File> [/ds] [/dm] [/b] [/r]
[/lang <Lang Code 1,Lang Code 2,Lang code N>] [/d] [/hb] [/ni] [/reboot]
[/shutdown] [/opwd <Current Ofbd Password>]
```

Where,

[/cpwd] → Indicates admin password of type unicode

[/cpwds] → Indicates admin password of type scan code

[/cpwde] → Indicates admin password of type EFI key

[/cpwdf] → Indicates file having admin password of type unicode

[/cpwdsf] → Indicates file having admin password of type scan code

[/cpwdef] → Indicates file having admin password of type EFI key

/i → Indicates Import modified script file to the NVRAM

/s → Indicates the NVRAM script file to use to read data

/ds →Indicates set "BIOS" defaults from script question value

/dm → Indicates set "MFG" defaults from script question value

[/b] → Optional CMD line option that enables import of boot order controls from the generated script file.

[/r] → Optional CMD line option in SCEWIN, SCEEFI, SCEBSD, SCELNX that enables the tool to verify that the CRC32 of host HII IFR packs is identical to the CRC32 in the advanced script file before performing any variable updates. If not identical, then the application exits with relevant error message.

[/lang] → Optional CMD line option that enables mapping language mode which will import questions with the specified lang codes. Lang Code indicates the code for a particular languages like for English(en-US), AMI(x-AMI) etc.

***Note**: Although mapping language mode supports multiple languages, the output script file supports English only.*

[/d] → Optional command line option to Skip checking for AptioV BIOS and behave normally

[/cpwd | /cpwds | /cpwde | /cpwdf | /cpwdef | cpwdsf] Unlock variables with administrator password until AMISCE completes execution.

[/hb] → Optional command line option to hide the tool information banner.

[/ni] → Optional command line option to create UtilityIndication variable to indicate variable modification by AMISCE.

[/reboot] → Optional command line option to reboot/restart the system after any variable modification by AMISCE.

[/shutdown] → Optional command line option to shut down the system after any variable modification by AMISCE.

[/opwd] → Optional command line option to validate the ofbd password.

The user may optionally give the /q option to suppress all warning messages.

***Note**: Reboot and Shutdown options will lead to restart or shut down of the system immediately and may result in any unsaved process being lost. Please close other processes in OS before reboot or shutdown using AMISCE. Option /ni will always create variable UtilityIndication with variable data as 01 even if it already exist in NVRAM.*

2.2.2 Disable Boot Option

SCE supports disabling boot options in default import mode.

BIOS without FixedBootOrder Module

When FixedBootOrder module is not present, SCE supports disabling only legacy boot options. To disable a legacy boot option, follow below steps:

Export the script in advanced mode with /b option.
Change the higher order byte of the boot option to be disabled to 'FF'.
Import the script with /b option.

For example, consider the below legacy device boot order:

```
Setup Question    = BBS_TYPE_HARDDRIVE Boot Option #
Map String  = SETUP006
```

```
Help String = Modifies device order
Token =9F0  // Do NOT change this line
Offset      =00
Width =02
ListOrder   = [0019]BBS_TYPE_HARDDRIVE 0019
              [001b]BBS_TYPE_HARDDRIVE 001b
```

To disable the first boot option, change the entry as below and import the script with /b option.

```
Setup Question    = BBS_TYPE_HARDDRIVE Boot Option #
Map String  = SETUP006
Help String = Modifies device order
Token =9F0  // Do NOT change this line
Offset      =00
Width =02
ListOrder   = [FF19]BBS_TYPE_HARDDRIVE 0019
              [001b]BBS_TYPE_HARDDRIVE 001b
```

BIOS with FixedBootOrder Module

When FixedBootOrder module is present, SCE supports disabling both legacy and UEFI boot options. To disable a boot option, follow below steps:

Export the script in advanced mode with /b option.
Choose 'Disable' for the boot option to be disabled.
Import the script with /b option.

For example, consider the below boot option:

```
Setup Question    = Boot Option #2
Map String  = Boot Option #2
Help String = Modifies boot order
Token =1345 // Do NOT change this line
Offset      =145
Width =01
BIOS Default      =[01]Windows Boot Manager (P3: ST500DM002-1ER14C)
Options     =[00]ubuntu (P1: ST500DM002-1BC142) // Move "*" to the desired Option
         *[01]Windows Boot Manager (P3: ST500DM002-1ER14C)
           [12]Disable
```

To disable, move '*' to 'Disable' entry and import the script with /b option.

```
Setup Question    = Boot Option #2
Map String  = Boot Option #2
Help String = Modifies boot order
Token =1345 // Do NOT change this line
Offset      =145
Width =01
BIOS Default      =[01]Windows Boot Manager (P3: ST500DM002-1ER14C)
Options     =[00]ubuntu (P1: ST500DM002-1BC142) // Move "*" to the desired Option
         [01]Windows Boot Manager (P3: ST500DM002-1ER14C)
        * [12]Disable
```

2.2.3 Raw Import Mode

```
AMISCE /i [/cpwd | /cpwds | /cpwde <admin password> | /cpwdf |/cpwdef | /cpwdsf
<File having Current Admin Password>] /l <listing file> /n <NVRAM Dump File> [/f]
[/d] [/hb] [/ni] [/shutdown] [/reboot] [/opwd <Current Ofbd Password>]
```

Where,

[/cpwd] → Indicates admin password of type Unicode.

[/cpwds] → Indicates admin password of type scan code.

[/cpwde] → Indicates admin password of type EFI key.

[/cpwdf] → Indicates file having admin password of type Unicode.

[/cpwdsf] → Indicates file having admin password of type scan code.

[/cpwdef] → Indicates file having admin password of type EFI key.

/i → Indicates Import modified Variable data found in Listing File to the NVRAM

/l → Indicates Variable Listing File.

/n → Indicates NVRAM Dump File.

[/d] -> Optional command line option to Skip checking for AptioV BIOS and behave normally

[/cpwd | /cpwds | /cpwde | /cpwdf | /cpwdef | cpwdsf] → Unlock variables with administrator password until AMISCE completes execution.

[/hb] → Optional command line option to hide the tool information banner.

[/ni] → Optional command line option to create UtilityIndication variable to indicate variable modification by AMISCE.

[/reboot] → Optional command line option to reboot/restart the system after any variable modification by AMISCE.

[/shutdown] → Optional command line option to shut down the system after any variable modification by AMISCE.

[/opwd] → Optional command line option to validate the ofbd password.

The tool verifies that the CRC32 of host HII IFR packs is identical to the CRC32 in the variable file before performing any variable updates. Usage of the 'f' option will suppress this check.

2.2.4 NVRAM Variable Access Unlock

Access to writing certain NVRAM variables may be locked out in some BIOS configurations. SCE can unlock them with the BIOS administrator password and update those variables.

AMISCE [/cpwd | /cpwds | /cpwde] <administrator password> /i < other parameters>

or

AMISCE [/cpwdf | /cpwdsf | /cpwdef] <File having Current Admin Password> /i <other parameters>

Where,

[/cpwd] → Indicates admin password of type Unicode.

[/cpwds] → Indicates admin password of type scan code.

[/cpwde] → Indicates admin password of type EFI key.

[/cpwdf] → Indicates file having admin password of type Unicode.

[/cpwdsf] → Indicates file having admin password of type scan code.

[/cpwdef] → Indicates file having admin password of type EFI key.

The variable access is re-locked on application exit. So, it is required to use /cpwd or /cpwds or /cpwde or /cpwdf or /cpwdsf or /cpwdef each time with import command for protected variable update. SCE shows the message "Variable access re-locked" on successful re-lock of the protected variables.

Also, there is a retry limit of 3 for the unlock attempt. If the retry limit is exceeded, then system reboot is required to try again.

Example: During import of Advance Mode Script.

Example 1: **AMISCE /i /s script.txt**

***Note**: The warning message "Please use /cpwd <admin_pwd> to update protected variables." could be one of these two cases:*

a. AmiSetupNvLock module is present, but admin password is not set. The users should set admin passwords before running SCE tools.
b. AmiSetupNvLock module is present, and admin password is set already. The users should use /cpwd to set admin password.

Example 2: **AMISCE /i /s script.txt /cpwd PASSWORD**

***Note**: '/cpwd or /cpwds or /cpwde or /cpwdf or /cpwdsf or /cpwdef' cannot be used as stand-alone option.*

2.2.5 Change User/Admin Password

SCE supports changing user/admin passwords for BIOS setup. The current admin password needs to be provided using /cpwd or /cpwds or /cpwde.

```
AMISCE [/cpwd | /cpwds /cpwde] <current admin password> [/apwd | /apwds | /apwde]
<new admin password> [/upwd | /upwds / upwde] <new user password> [/hb]
```

or

```
AMISCE [/cpwdf | /cpwdsf /cpwdef] <file having current admin password> [/apwdf |
/apwdsf | /apwdef] <file having new admin password> [/upwdf | /upwdsf / upwdef]
<file havinf new user password> [/hb]
```

Where,

[/cpwd] → Indicates admin password of type unicode

[/cpwds] → Indicates admin password of type scan code

[/cpwde] → Indicates admin password of type EFI key

[/apwd] → Indicates new admin password of type unicode

[/apwds] → Indicates new admin password of type scan code

[/apwde] → Indicates new admin password of type EFI key

[/upwd] → Indicates new user password of type unicode

[/upwds] → Indicates new user password of type scan code

[/upwde] → Indicates new user password of type EFI key

[/cpwdf] → Indicates file having admin password of type unicode

[/cpwdsf] → Indicates file having admin password of type scan code

[/cpwdef] → Indicates file having admin password of type EFI key

[/apwdf] → Indicates file having new admin password of type unicode

[/apwdsf] → Indicates file having new admin password of type scan code

[/apwdef] → Indicates file having new admin password of type EFI key

[/upwdf] → Indicates file having new user password of type unicode

[/upwdsf] → Indicates file having new user password of type scan code

[/upwdef] → Indicates file having new user password of type EFI key

[/hb] → Optional command line option to hide the tool information banner

Examples of password types used with password switches

2.2.5.1.1 Unicode Password usage:

```
AMISCE /cpwd test123 /apwd 123test /upwd test
```

or

```
AMISCE /cpwdf admin.bin /apwdf newadmin.bin /upwdf user.bin
```

or

```
AMISCE /cpwd test123 /apwdf newadmin.bin /upwdf user.bin
```

***Note**: The .bin files mentioned above should have the unicode password in UTF-16 format. User can use file variant password switch and commandline password switch together as shown above.*

2.2.5.1.2 Scan code Password usage:

```
AMISCE /cpwds 0x14 0x12 0x1F 0x14 0x02 0x03 0x04 /apwds 0x02 0x03 0x04 0x14 0x12
0x1F 0x14  /upwds 0x14 0x12 0x1F 0x14
```

or

```
AMISCE /cpwdsf adminscan.bin /apwdsf newscanpwd.bin /upwdsf userscanpwd.bin
```

or

```
AMISCE /cpwdsf adminscan.bin /apwds 0x02 0x03 0x04 0x14 0x12 0x1F 0x14  /upwdsf
userscanpwd.bin
```

2.2.5.1.3 EFI key password Usage:

```
AMISCE /cpwde 0x35 0x33 0x21 0x35 0x45 0x46 0x47 /apwde 0x45 0x46 0x47 0x35 0x33
0x21 0x35 /upwde 0x35 0x33 0x21 0x35
```

or

```
AMISCE /cpwdef adminefipwd.bin /apwdef newefipwd.bin /upwdef userefipwd.bin
```

or

AMISCE /cpwde 0x35 0x33 0x21 0x35 0x45 0x46 0x47 /apwdef newefipwd.bin /upwde 0x35 0x33 0x21 0x35

***Note**: 0x prefix is optional with Scan code and EFI key. Scan codes and EFI key codes mentioned above are according to keyboard layout English(United States)-US.*

2.3 PLDM Support

SCE supports exporting the setup configuration to PLDM data structures. This is useful especially while migrating the BIOS configuration. SCE generates a single binary file as output with all the PLDM data structures combined together. The exported PLDM file can then be imported using SCE to apply the configuration on the target system. The below commands can be used for export and import:

2.3.1 PLDM Export

AMISCE /o /p <PLDM file name> [/lang <Lang Code 1,Lang Code 2,Lang code N>] [/sp] [/g] [/b] [/ndef] [/hb]

Where,

/o → Export configuration command.

/p → Indicates PLDM file.

[/sp] → Optional CMD line option that enables Expression Evaluation for Suppressif Opcode.

[/g] → Optional CMD line option that enables Expression Evaluation for Grayoutif Opcode.

[/b] → Optional CMD line option that enables export of boot order controls in the generated PLDM file.

[/ndef] → Optional command line option to export only those questions whose value is different from the default.

[/lang] → Optional CMD line option that enables mapping language mode which will export questions with the specified lang codes. Lang Code indicates the code for a particular languages like for English(en-US), AMI(x-AMI) etc.

***Note**: Although mapping language mode supports multiple languages, the output script file supports English only.*

[/hb] → Optional command line option to hide the tool information banner.

Example: General export of PLDM File.

AMISCE /o /p PldmFile

2.3.2 PLDM Import

AMISCE /i /p <PLDM file name> [/lang <Lang Code 1,Lang Code 2,Lang code N>] [/b] [/hb] [/ni] [/shutdown] [/reboot] [/cpwd | /cpwds | /cpwde <admin password> | /cpwdf |/cpwdef | /cpwdsf <File having Current Admin Password>] [/opwd <Current Ofbd Password>]

Where,

/i →. Import configuration command.

[/cpwd] →. Indicates admin password of type unicode

[/cpwds] →. Indicates admin password of type scan code

[/cpwde] →. Indicates admin password of type EFI key

[/cpwdf] →. Indicates file having admin password of type unicode

[/cpwdsf] →. Indicates file having admin password of type scan code

[/cpwdef] →. Indicates file having admin password of type EFI key

[/cpwd | /cpwds | /cpwde | /cpwdf | /cpwdef | cpwdsf→. Unlock variables with administrator password until AMISCE completes execution.

/p →. Indicates PLDM file

[/b] →. Optional CMD line option that enables import of boot order controls from the input PLDM file.

[/lang] →. Optional CMD line option that enables mapping language mode which will import questions with the specified lang codes. Lang Code indicates the code for a particular languages like for English(en-US), AMI(x-AMI) etc.

***Note**: Although mapping language mode supports multiple languages, the output script file supports English only.*

[/hb] →. Optional command line option to hide the tool information banner.

[/ni] →. Optional command line option to create UtilityIndication variable to indicate variable modification by AMISCE.

[/reboot] →. Optional command line option to reboot/restart the system after any variable modification by AMISCE.

[/shutdown] →. Optional command line option to shut down the system after any variable modification by AMISCE.

[/opwd] →. Optional command line option to validate the ofbd password.

Example: General import of PLDM File.

```
AMISCE /i /p PldmFile /cpwd PASSWORD
```

2.4 Single Question Update from Command Line

This feature allows to update single setup questions from command line without using the script file. It makes use of the mapping language string to uniquely identify the question. The map string for a question can be known by exporting the script with '/lang' option. The '/lang' option will add the 'Map String' field for each setup question in the script. To use the '/lang' option, the Aptio firmware should have the mapping language enabled. The command line usage is shown below:

```
AMISCE /i [/cpwd | /cpwds | /cpwde <admin password> | /cpwdf |/cpwdef | /cpwdsf
<File having Current Admin Password>]
[/lang <Lang Code 1,Lang Code 2,Lang code N>] /ms <map string> /qv <question value>
[/bt <device type>] [/q] [/d] [/dm] [/ds] [/hb] [/ni] [/shutdown] [/reboot] [/opwd
<Current Ofbd Password>]
```

Where,

/i →. Indicates Import question values to the NVRAM

[/cpwd] →. Indicates admin password of type unicode

[/cpwds] →. Indicates admin password of type scan code

[/cpwde] →. Indicates admin password of type EFI key

[/cpwdf] →. Indicates file having admin password of type unicode

[/cpwdsf] →. Indicates file having admin password of type scan code

[/cpwdef] →. Indicates file having admin password of type EFI key

[/cpwd | /cpwds | /cpwde | /cpwdf | /cpwdef | cpwdsf→. Unlock variables with administrator password until AMISCE completes execution. This option needed only if the variable to update is protected.

[/lang] →. Optional command line to specify the mapping languages to look the setup question mapping string. The default is x-AMI and x-UEFI-AMI.

***Note**: Although mapping language mode supports multiple languages, the output script file supports English only.*

/ms →. Used to specify map string for the particular setup question.

/qv →. Used to specify the value for the setup question.

[/bt] →. Used to mention the device type for legacy boot order update.

[/q] →. Optional command line option to suppress all warning messages.

[/d] →. Optional command line option to Skip checking for AptioV BIOS and behave normally

[/ds] →. Optional command line option Indicates set “BIOS” defaults from question value.

[/dm] →. Optional command line option Indicates set “MFG” defaults from question value.

[/hb] →. Optional command line option to hide the tool information banner.

[/ni] →. Optional command line option to create UtilityIndication variable to indicate variable modification by AMISCE.

[/reboot] →. Optional command line option to reboot/restart the system after any variable modification by AMISCE.

[/shutdown] →. Optional command line option to shut down the system after any variable modification by AMISCE.

[/opwd] →. Optional command line option to validate the ofbd password.

2.4.1 Examples for Single Question Update

Boot Order question:

The question value should be a comma separated list of boot devices where each boot device is represented using the unique number assigned to it in the UEFI boot order. The list should contain all devices in the current boot order.

```
AMISCE /i /ms SETUP001 /qv 0x0002,0x0001
```

Legacy Device Order question:

The question value should be a comma-separated list of boot devices where each boot device is represented by the predefined token value associated with it. The list should contain all devices of the specified type in the current boot order. The boot device type string should be one of the below:

```
BBS_TYPE_FLOPPY
BBS_TYPE_HARDDRIVE
BBS_TYPE_CDROM
BBS_TYPE_PCMCIA
BBS_TYPE_USB
BBS_TYPE_EMBEDDED_NETWORK
BBS_TYPE_BEV
BBS_TYPE_UNKNOWN
```

The device type string is the same as the first part of the legacy boot order Setup Question name in script.

```
AMISCE /i /ms SETUP002 /bt BBS_TYPE_HARDDDRIVE /qv 0x0019,0x001A
```

Language/Platform Language question:

The question value represents the index of the language in the list of supported languages.

```
AMISCE /i /ms SETUP003 /qv “<-10>”
```

Numeric question:

The question value represents the new value. This should be within the valid range.

```
AMISCE /i /ms SETUP004 /qv 0x09
```

Checkbox question:

The question value should be either 0 or 1.

```
AMISCE /i /ms SETUP005 /qv 0x01
```

One-of question:

The question value represents the index of the option in the list of options.

```
AMISCE /i /ms SETUP006 /qv 0x02
```

Date question:

The question value represents the date value in MM-DD-YYYY format.

```
AMISCE /i /ms DATE002 /qv 01-30-2019
```

Time question:

The question value represents the time value in HH:MM:SS format.

```
AMISCE /i /ms TIME001 /qv 23:59:59
```

List Order question:

The question value should be a comma-separated list of options.

```
AMISCE /i /ms TEST012 /qv 0x0003,0x0001,0x0005,0x0007,0x0009,0x0000
```

Note*: String type questions are not supported currently. Decimal numeric value(including negative numbers) has to be mentioned with angular brackets (<>) and mentioning the angular brackets without quotation might lead to file redirection warnings. Numeric value will be taken as hexadecimal value (0x prefix is optional) if not mentioned in decimal format.*

2.4.2 Disable Boot Option

SCE supports disabling legacy boot options from command line. To disable a boot option, specify the higher order byte of the entry to be disabled as 'FF'. An example is shown below:

```
AMISCE /i /ms SETUP007 /bt BBS_TYPE_HARDDDRIVE /qv 0xff19,0x001a
```

Note*: The BIOS should not have FixedBootOrder module. If FixedBootOrder module is present, use default import mode to disable boot options.*

2.5 Read Single Question from Command Line

This feature allows reading single setup question's value from command line without using the script file. It makes use of the mapping language string to uniquely identify the question. The map string for a question can be known by exporting the script with '/lang' option. The '/lang' option will add the 'Map String' field for each setup question in the script. To use the '/lang' option, the Aptio firmware should have the mapping language enabled. The command line usage is shown below:

```
AMISCE /o [/lang <Lang Code 1,Lang Code 2,Lang code N>] /ms <map string> [/ov] [/q]
[/hb] [/ds] [/dm]
```

Where,

/o →. Indicates export question values

[/lang] →. Optional command line to specify the mapping languages to look the setup question mapping string. The default is x-AMI and x-UEFI-AMI.

***Note**: Although mapping language mode supports multiple languages, the output script file supports English only.*

/ms →. Used to specify map string for the particular setup question.

[/q] →. Optional command line option to suppress all warning messages.

[/hb] →. Optional command line option to hide the tool information banner.

[/ds] →. Optional command line option to show BIOS defaults.

[/dm] →. Optional command line option to show Manufacturing defaults.

[/ov] →. Optional used to print question value only.

2.5.1 Example to read Single Question Value from Command Line

Command should contain the unique mapping string of the setup question as shown below.

```
AMISCE /o /ms setup00 /lang x-AMI
```

***Note**: AMISCE Single Question export and update feature should be used with mapping languages only.*

2.6 Sample Report

The following program sample illustrates the listing of file content, where the two NVRAM variables shown below contain their Name and GUID. All numeric values are in hexadecimal notation only.

2.6.1 Default Output with Verbose option

```
// Script File Name: script.txt
// Created on 08/15/19 at 04:20:47
// AMISCE Utility. Ver 5.03.1131
// Copyright (c) 1985-2019, American Megatrends International LLC.
// All rights reserved. Subject to AMI licensing agreement.

HIICrc32 = 5CFC3E93

// FORM SET
// GUID     = ec87d643-eba4-4bb5-a1e5-3f3e36b20da9
// Title    = Main
// Help     = System Overview
// Class    = 01
// SubClass = 00

// FORM
// FORM ID  = 01
// Title    = Main

Setup Question    = System Language
Help String = choose system default language
Token =00   // Do NOT change this line
Offset      =00
Width =02
BIOS Default      = [0] N/A
MFG Default = [0] N/A
Options     = *[00] English
```



```
// FORM SET
// GUID     = ec87d643-eba4-4bb5-a1e5-3f3e36b20da9
// Title    = Advanced
// Help     = Advanced Settings
// Class    = 02
// SubClass = 00

// FORM
// FORM ID  = 02
// Title    = Advanced

Setup Question    = Launch PXE OpROM
Help String = Help string
Token =00   // Do NOT change this line
Offset      =1B
Width =01
BIOS Default      = 00
MFG Default = 01
Value =1

// Subtitle = PCI Common Settings

Setup Question    = PCI Latency Timer
Help String = Help string
Token =00   // Do NOT change this line
Offset      =03
Width =01
BIOS Default      = [20]32 PCI Bus Clocks
MFG Default = [20]32 PCI Bus Clocks
Options     =*[20]32 PCI Bus Clocks // Move "*" to the desired Option
          [40]64 PCI Bus Clocks
          [60]96 PCI Bus Clocks
          [80]128 PCI Bus Clocks
          [A0]160 PCI Bus Clocks
          [C0]192 PCI Bus Clocks
          [E0]224 PCI Bus Clocks
          [F8]248 PCI Bus Clocks


Setup Question    = Setup Prompt Timeout
Help String = Help string
Token =00   // Do NOT change this line
Offset      =00
Width =02
BIOS Default      = 01
MFG Default = 01
Value =05

Setup Question    = Boot Option #
Help String = Help string
Token =00   // Do NOT change this line
Offset      =00
Width =02
BIOS Default      = [0] N/A
MFG Default = [0] N/A
ListOrder   = [0001] Built-in EFI Shell
```

```
                [0000] Hard Drive
                [0003] UEFI: PNY USB 2.0 FD PMAP
                [0002] CD/DVD Drive

Setup Question    = OrderedList32
Help String = Help string
Token =58   // Do NOT change this line
Offset      =558
Width =04
BIOS Default  = {07,09,03,05,00,01}
MFG Default   = {03,09,07,05,00,01}
ListOrder     = [07]OPTION 8
                [09]OPTION 10
                [03]OPTION 4
                [05]OPTION 6
                [00]OPTION 1
                [01]OPTION 2
```

2.6.2 Raw Mode Outputs

Variable Listing File

```
[VARIABLE]
VARIABLE_NAME = MonotonicCounter
VARIABLE_GUID = 8be4df61-93ca-11d2-aa0d-00e098032b8c

[VARIABLE]
VARIABLE_NAME = SetupCpuFeatures
VARIABLE_GUID = ec87d643-eba4-4bb5-a1e5-3f3e36b20da9
```

The following sample illustrates the script file content, where the two types of NVRAM variables shown below contain their GUID, Attribute, Name and the data.

```
Version
00000001
HiiCrc32
2b147ed6

GUID
8be4df61-93ca-11d2-aa-0d-00-e0-98-03-2b-8c
Attributes
00000007
VariableName
MonotonicCounter
VariableData
06 00 00 00

GUID
61dfe48b-ca93-d211-aa-0d-00-e0-98-03-2b-8c
Attributes
00000007
VariableName
SetupCpuFeatures
VariableData
00 00 01 00 01 00 01 01 00
```

2.7 Instructions on using AMISCE

2.7.1 Default Mode Usage (/s)

- From CMD line environment execute AMISCE using the following command to generate the NVRAM script file:

'AMISCE /o /s <NVRAM.txt> [/h <Hii.db>] [/b] [/v] [/lang <en-US>] [/sp] [/g]'

Where,

NVRAM.txt – NVRAM script file

Hii.db – HII dump output file

en-US - Language code for English.

- Now open the generated script file and modify the required setup question value and save the modifications. You should remove any setup questions that you do not wish to update.
- Now from CMD line environment execute the following command:

AMISCE /i /s <NVRAM.txt> [/r] [/b] [/lang <en-US>]

Where,

NVRAM.txt – NVRAM script file

en-US - Language code for English.

- The new settings are updated into the NVRAM.
- The default export behavior without /b option will be not to export boot order controls. To enable exporting of boot order controls provide /b option.
- The default import behavior without /r option will not check whether CRC32 of host HII IFR packs is identical to the CRC32 in the advanced script file. To enable the verification of CRC32 value provide /r option.

***Note**: In order to evaluate the expression properly, the dependent NVRAM variable of the setup question should have runtime access.*

- If /sp command is given while export operation and if expression evaluation results in suppress then AMISCE will not export the suppressed setup question or suppressed forms to the script file. If /g command is given while export operation and if expression evaluation results in grayout, then AMISCE will not export the grayed out setup question or grayed out forms to the script file.
- If /ce command is mentioned with /sp or /g then it will export the suppressed or grayed out controls and forms in commented format to the script file.

***Note**: Suppressed Form may contain Grayed Out setup questions also.*

Similarly Grayed Out Form may also contain Suppressed setup question.

Examples:

1. When only /g and /ce option is mentioned during export.

Example: **AMISCE /o /s script.txt /g /ce**

Here, output Grayed out forms and controls are commented

```
// GRAYOUT FORM
// Setup Question = Out-of-Band Mgmt Port
// Help String    = Help string
// Token    =304  // Do NOT change this line
// Offset   =1067
// Width    =01
```

```
// BIOS Default =[00]COM0
// MFG Default =[00]COM0
// Options  =*[00]COM0  // Move "*" to the desired Option

// GRAYOUT
// Setup Question = Terminal Type
// Help String    = Help string
// Token    =305  // Do NOT change this line
// Offset   =1068
// Width    =01
// BIOS Default =[02]VT-UTF8
// MFG Default =[02]VT-UTF8
// Options  =[00]VT100  // Move "*" to the desired Option
//          [01]VT100+
//          *[02]VT-UTF8
//          [03]ANSI
// ENDOF GRAYOUT
// ENDOF GRAYOUT FORM
```

2. When only /sp and /ce option is mentioned during export.

Example: **AMISCE /o /s script.txt /sp /ce**

Here, output suppressed forms and controls are commented

```
// SUPPRESS
// Setup Question = CLPO Performance Control
// Help String    = Help string
// Token    =304  // Do NOT change this line
// Offset   =1002
// Width    =01
// BIOS Default =[00]COM0
// MFG Default =[00]COM0
// Options  =*[00]COM0  // Move "*" to the desired Option
// ENDOF SUPPRESS
```

3. When only /g, /sp and /ce option is mentioned during export.

Example: **AMISCE /o /s script.txt /g /sp /ce**

Here, output suppressed and Grayed out forms and controls are commented

```
// GRAYOUT FORM

// SUPPRESS
// Setup Question = Out-of-Band Mgmt Port
// Help String    = Help string
// Token    =304  // Do NOT change this line
// Offset   =1067
// Width    =01
// BIOS Default =[00]COM0
// MFG Default =[00]COM0
// Options  =*[00]COM0  // Move "*" to the desired Option
// ENDOF SUPPRESS

// GRAYOUT
// Setup Question = Terminal Type
// Help String    = Help string
// Token    =305  // Do NOT change this line
// Offset   =1068
// Width    =01
```

```
// BIOS Default =[02]VT-UTF8
// MFG Default =[02]VT-UTF8
// Options  =[00]VT100  // Move "*" to the desired Option
// [01]VT100+
// *[02]VT-UTF8
// [03]ANSI
 // ENDOF GRAYOUT

// ENDOF GRAYOUT FORM
```

4. AMISCE will export setup questions with mapstring if /lang option is provided. While importing if /lang option is there, it will check for setup question prompt and mapstring alone between advanced script file and host system.

   For example, if in the script file a setup question is like :

   Setup Question = Setup Prompt Timeout

   Mapstring = BOOT001

   Help String = change timeout value

   Token =00 // Do NOT change this line

   Offset =00

   Width =02

   BIOS Default = 01

   MFG Default = 01

   Value =05

   And the command is given as : **SCEWIN.exe /i /s Script.txt /lang** , this will check for “ Mapstring”. If it is not found the application will report an error.

5. The default mapping language is x-AMI and x-UEFI-AMI. If user gives /lang option alone then it will export setup questions with mapstring and output should contain both English and x-AMI/x-UEFI-AMI mapping strings. If user provides /lang option with a language code then SCE will check whether that language code strings are there in target machine, if it is there it will export setup questions with mapstring and output should contain mapping strings from the specified language code strings. If the specified languages is not present in system, then it will show a warning message and it will not export any setup question.
6. While importing if /lang option is there the question matching should be done using the default mapping language string instead of the English string and if user gives /lang option with a language code then questions containing that language code strings only will be imported.

   If /lang option is not mentioned while exporting or importing then it will not contain map string field in the script.

   Export Command Usage: **SCEWIN.exe /o /s Script.txt .**

   The setup question in the script will be like:

   Setup Question = Setup Prompt Timeout

   Help String = change timeout value

   Token =00 // Do NOT change this line

   Offset =00

   Width =02

   BIOS Default = 01

   MFG Default = 01

   Value =05

***Note**: Some BIOS contain duplicate setup questions. Before importing the script, any duplicate questions should be removed.*

2.7.2 Raw Mode Usage (/n)

- AMISCE requires the knowledge of setup question offset to manipulate NVRAM variables. From windows environment execute AMISDE on the target firmware image using the command

'AMISDE /i <firmware image> /o <output report> /v'

For example,

While manipulating “Pxe Boot Option” setup question, the user can manually select the mode as either Enabled or Disabled by altering the predefined Width (0x0001) in the specified OFFSET value (0x000D) located in the output extracted using AMISDE.

For Disabled Mode,

```
Variable Name
Setup
Variable Data
00 01 20 00 00 00 00 00 01 37 37 37 00 00 02 00 00 FF 00 00 00 00 00 00 00 37 00 00
00 00 00 00 02 00 01 00 01 00 00 00 00 00 00 00 00 00 00 01 00 03 03 01 FF 01 01 00
08 00 00 00 00 01 00 00 01 01 01 01 FE 00
```

For Enabled Mode,

```
Variable Name
Setup
Variable Data
00 01 20 00 00 00 00 00 01 37 37 37 00 01 02 00 00 FF 00 00 00 00 00 00 00 37 00 00
00 00 00 00 02 00 01 00 01 00 00 00 00 00 00 00 00 00 00 01 00 03 03 01 FF 01 01 00
08 00 00 00 00 01 00 00 01 01 01 01 FE 00
```

- Open the report file and browse for the setup question values that need to be changed. Note down the Variable Name and Variable GUID for the setup questions that need the values changed.
- Now create a Variable Listing file for input to AMISCE with the Variable information collected previously. Many variables are used for purposes other than setup question data so you should take care to update only the desired variable. The listing file format is as described above.
- Now from the CMD line environment execute AMISCE using the following command to generate the NVRAM script file:

'AMISCE /o /h <Hii.db> /l <Listing.txt> /n <NVRAM.txt>'

Where,

Listing.txt - Variable listing file created in the previous step.

Hii.db - HII dump output file

NVRAM.txt - NVRAM variable script output file in ASCII format

- Now open AMISDE report file to get a setup question's offset and width.
- Open the NVRAM script file for modification.
- Get the question's offset and data width, to modify a setup question's value. In the NVRAM script file, locate the correct Variable data, and change the data values. The Variable Data are formatted with 16-bytes in a line with each byte separated by a space.
- Once all the modification to the NVRAM file is done from the CMD line environment, execute the following command to save the values back into NVRAM

'AMISCE /i /l Listing.txt /n NVRAM.txt'

Where,

Listing.txt - Variable Listing file

NVRAM.txt - NVRAM variable script file is modified in previous step.

- The new settings are now updated into the NVRAM.

***Note**: AMISCE provides a complete listing of all the questions or variables available in the BIOS, and the user can alter/remove any setting in the script according to their needs. Once the script is modified, they can use their modified script for the installation of these new settings. When importing settings to a different machine you should take care to remove questions that may have values not appropriate for the new environment.*

2.8 Creating a new NVRAM Variable

New NVRAM variables can be created using raw mode import feature.

2.8.1 Steps to create a new variable in NVRAM:

- Using Raw Mode Export Command generate the list file and nvram script file.

```
AMISCE /o /c /l list.txt /n nvram.txt /h Hii.db
```

- Now Open the list.txt and add the new variable to listing file like

New Variable

```
[VARIABLE]
VARIABLE_NAME = XYZ
VARIABLE_GUID = xxxxxxxx-xxxx-xxxx-xxxx-xxxxxxxxxxxx
```

And Open nvram.txt file and Add new variable, Attributes and Variable Data

New Variable

```
GUID
xxxxxxxx-xxxx-xxxx-xxxx-xxxxxxxxxxxx
Attributes
xxxxxxxx
Variable Name
XYZ
Variable Data
xx xx xx xx xx xx xx .. .. …
```

- Then using import command Import the script file to create new variable in NVRAM

```
AMISCE /i /l List.txt /n nvram.txt
```

- To check whether the new variable is created or not. Then generate list and nvram file again using export command

```
AMISCE /o /c /l list_new.txt /n nvram_new.txt /h Hii_new.db
```

Open and check the new variable is present or not in list_new.txt as well as in nvram_new.txt file check variable specified above.

2.9 Creating or Updating a NVRAM Variable from Command Line

Using single variable update mode user can create or update a NVRAM variable from command line. The user can provide string data directly in command line utilizing the ‘varvalue’ option or the binary data can be given through a file using ‘varfile’ option as shown below.

AMISCE /i /varname <variable_name> /varguid <variable GUID> /varvalue <string data> [/d] [/cpwd | /cpwds | /cpwde <admin password> | /cpwdf |/cpwdef | /cpwdsf <File having Current Admin Password>] [/hb] [/q] [/ni] [/shutdown] [/reboot] [/opwd <Current Ofbd Password>]

or

AMISCE /i /varname <variable name> /varguid <variable GUID> /varfile <variable data file> [/d] [/cpwd | /cpwds | /cpwde <admin password> | /cpwdf |/cpwdef | /cpwdsf <File having Current Admin Password>] [/hb] [/q] [/ni] [/shutdown] [/reboot] [/opwd <Current Ofbd Password>]

Where,

[/cpwd] →. Indicates admin password of type unicode

[/cpwds] → Indicates admin password of type scan code

[/cpwde] →. Indicates admin password of type EFI key

[/cpwdf] →. Indicates file having admin password of type unicode

[/cpwdsf] →. Indicates file having admin password of type scan code

[/cpwdef] →. Indicates file having admin password of type EFI key

[/cpwd | /cpwds | /cpwde | /cpwdf | /cpwdef | cpwdsf] → Unlock variables with administrator password until AMISCE completes execution. This option needed only if the variable to update is protected.

/i →. Indicates Import modified script file to the NVRAM

/varname →. Name of the NVRAM variable to update/create

/varguid →.GUID of the NVRAM variable to update/create

/varvalue →. Data of the NVRAM variable

/varfile →. File containg Data of the NVRAM variable

[/q] →. Optional command line option to suppress all warning messages.

[/d] →. Optional command line option to Skip checking for AptioV BIOS and behave normally

[/hb→. Optional command line option to hide the tool information banner.

[/ni] →. Optional command line option to create UtilityIndication variable to indicate variable modification by AMISCE.

[/reboot] →. Optional command line option to reboot/restart the system after any variable modification by AMISCE.

[/shutdown] →. Optional command line option to shut down the system after any variable modification by AMISCE

[/opwd] →. Optional command line option to validate the ofbd password.

***Note**: Variable GUID should be given in format "XXXXXXXX-XXXX-XXXX-XXXX-XXXXXXXXXXXX" and "varfile" expects binary file. String data entered along with varvalue option will be always stored in CHAR16 format.*

2.9.1 Examples for Single Variable Update

Any NVRAM variable can be updated or created as shown below.

AMISCE /i /varname Timeout /varguid 8be4df61-93ca-11d2-aa0d-00e098032b8c /varfile file.bin

or

AMISCE /i /varname Test /varguid 1be4df61-91ba-11d2-aa0d-00e098032b8c /varvalue ami

2.9.2 Sample Output

This illustrates the output of single variable update of variable with varvalue and varfile options in NVRAM for commands below.

```
AMISCE /i /varname Test /varguid 1be4df61-91ba-11d2-aa0d-00e09803288c /varvalue 0xa
```

Varvalue will always consider the input as string and store it in CHAR16 format. So the string “oxa” would be stored in NVRAM as,

```
GUID
1be4df61-91ba-11d2-aa0d-00e09803288c
Attributes
00000007
VariableName
Test
VariableData
30 00 78 00 61 00
```

The varfile option however will save the data as it is in the binary file to the NVRAM. If file.bin contains 05 00 then the same value will be updated in NVRAM also.

For command,

```
AMISCE /i /varname Test2 /varguid 8be4df61-93ca-11d2-aa0d-00e098032b33 /varfile
file.bin
```

The output would be,

```
GUID
8be4df61-93ca-11d2-aa0d-00e098032b33
Attributes
00000007
VariableName
Test2
VariableData
05 00
```

2.10 SCE Import Password

It is recommended to use AmiSetupNvLock for password support, in which case, the following is not applicable.

However, the BIOS can be optionally configured to request the OEM password for all import operations. The OEM password can be enabled in BIOS by enabling module “Oem Password Checking” present under "On Flash Block Description (APTIO)" module. The password retry count can be altered by the token PASSWORD_RETRY_NUM. The default retry count is three.

If the user fails to enter the correct OEM password within the maximum value for the password entry counter configured in the BIOS, they will have to reset the computer to clear the counter.

2.11 Getting Debug Traces

This feature will print additional debug traces. This will be helpful to analyze and root cause issues faced by users.



The Options that can be provided for debug log support are as follows,

/log → Directs debugInfo to screen

/loglvl: → Enables specific output (Allowed Levels 1,2,4 and 8)

- **1** → Enables LV_ALWS output
- **2** → Enables LV_KERN output
- **4** → Enables LV_LIBR output
- **8** → Enables LV_MODL output

/logfile: → Directs debugInfo to specific file

2.11.1 Example to enable debug log support with single question export command

Command should contain the unique mapping string of the setup question as shown below.

```
AMISCE /o /ms setup00 /lang x-AMI [/log] [/loglvl: 2] [/logfile: log.txt]
```

***Note**: We can use this debug log support with any export and import command. If we specify both /log and /logfile: switches, file redirection will take the high priority.*

2.12 SCE Script Comparison

This feature will compare the two script files or with target and output the difference to a new file. The command that can be provided for script comparison support is as follows,

```
AMISCE /cs <scriptfile_A> /cs <scriptfile_B> /o <scriptfile_Difference> [/q] [/hb]
```

or

```
AMISCE /cs <scriptfile_A> /o <scriptfile_Difference> [/q] [/hb]
```

Where,

/cs → Switch used to specify the script file for comparison

/o → Switch used to specify the output file name

Chapter 3

3 Appendix

3.1 Setting Passwords by Direct Update to Variables

It is recommended to use AmiSetupNvLock for password support.

The Aptio BIOS typically stores the passwords encrypted. For UEFI 2.1 BIOS, encryption is always used. The default encryption mechanism may be used; however, there is a hook in the BIOS project that allows for customization of the encryption mechanism. Thus, AMISCE has no way of reproducing the encryption of the BIOS password. However, AMISCE can still be used to replicate passwords on different systems.

3.1.1 Steps to setup a Password

The user can set a password through BIOS setup by following steps outlined below:

1. From BIOS Setup, set the desired password in a system.
2. Boot to an OS and use AMISCE (/o /n options) to extract the variable containing the password. This variable may be different for each BIOS, so the engineer responsible for the BIOS must provide this information. We recommend the use of a listing file ('/l' option) so that the script contains only the desired variable.
3. Use AMISCE (/i /n options) to install that password on other systems.

***Note**: AMISCE cannot decrypt the password; it is used to apply the password on other systems. If the other system has AmiSetupNvlock module then the AMITSESetup variable will be protected already, in which case this is not recommended. Because the user has to configure admin password in BIOS Setup first and input that password using /cpwd switch in step 3f.*

Example for changing Password without providing a Variable

Once the variable is extracted, the variable data corresponding to the particular variable name without inputting a password is displayed in the following format as outlined below,

```
Variable Name
AMITSESetup
Variable Data
00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00
00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00
00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00
00 00
```

To create a password, the user must change the variable data of the respective variable name, and install the password using the AMISCE in other systems. The below example shows a variable name with a password provided,

```
Variable Name
AMITSESetup
Variable Data
00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00
00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 006A 93 87 26
20 BA 6C 4D C7 E0 22 74 7D 07 D8 9A 33 2E 8E C1 E9 54 44 E8 9F 7B FA 0E 55
```

Limitations

AMISCE does not have the encryption mechanism to support encryption. So AMISCE must rely on the BIOS setup such as AMITSE setup, to perform initial encryption. To make sure that the source and destination BIOS uses the same encryption method, set a password on each and verify that the variable has the same value. A possible source of differences is the TSE token for password case independence.

3.2 BIOS Configuration Requirements

The BIOS Configuration Requirements for AMISCE are outlined below,

- Aptio core version 5.008 for UEFI 2.3 and above
- Requires “SmiVariable” module to be present in the BIOS. The module can be found at: Aptio V: $/AptioV/Source/Modules/SmiVariable labeled SmiVariable_04 or later
  Aptio 4: $/Alaska/BIN/Modules/SmiVariable labeled 4.6.3_SmiVariable_1.2 or later.

Note*: AMISCE displays an error message and exits with an error code if the SmiVariable module is absent.*

- For update of default values to be effective, the TSE module must be labeled 4.6.2_TSE_2_02_1205_BETA or later (for Aptio 4) and AMITSE_2_20_1270 or later (for Aptio V).
- Enable token ALWAYS_PUBLISH_HII_RESOURCES
- Requires ‘AmiSetupNvLock’ BIOS module for BIOS password check/change and NVRAM variable update protection. The module can be found at: Aptio V: $/AptioV/Source/Modules/AMISetupNVLock labeled AmiSetupNvLock_4 or later
  Aptio 4: $/Alaska/SOURCE/Modules/AMISetupNvLock labeled 4.6.2_AmiSetupNvLock_1_02 or later
- If present, TSE tokens RT_ACCESS_SUPPORT_IN_HPKTOOL and RT_ACCESS_FOR_EFIVARSTORE must be enabled.
- Bios version check requires:
  ACPI label ‘ACPI_17’ or later for Aptio V.
  ACPI label ‘4.6.5.0_ACPI_48’ or later for Aptio 4.
- SCE Linux under Xen (domain0 only) requires RuntimeMemoryHole Module.
  If Sce Driver is already present then user needs to delete it first and then run AmiSce
- SCE for ARM Linux or EFI requires SceHiiInterface module in place of SmiVariable. Note that SceLnxArm does not require a Linux driver.
- For update of question values from command line and PLDM support, the Aptio firmware should have the mapping language support enabled. The default mapping language x-AMI can be enabled by adding it to ‘RFC_LANGUAGES’ token value.
- For disable boot option support, TSE token TSE_SAVE_DISABLED_BBS_DEVICEPATH must be OFF. Otherwise, the change will be lost on next boot.
- For disable boot option support to work when FixedBootOrder module is present, Use label ‘FixedBootOrder_14’ or later.
  The module can be found at:

  AptioV: $/AptioV/Source/Modules/BootOptionPolicies/FixedBootOrder

- For date/time support, the controls should have STORAGE_NORMAL type in flags field.
- NVRAM_34 supports variable size larger than 64K.

Note*: While building ETA project, please ensure that there are not LIB & INCLUDE environment variables pointing to Visual Studio paths. This will create conflicts in the build environment and the project might not build successfully.*

3.3 Error and Warning Messages

AMISCE may give non-fatal warning messages. Warnings may be suppressed using the /q option in the command line. These are the most common:

1. Warning in line nnnn

   Missing Current Setting "*"

   Where nnnn is the line number of the input script where the error was detected. This is the first line of the setup question after the line that does not have the "*" character beside any of the option values. The user could have omitted the "*" when editing the script or the question did not have a value when the script was created.

2. WARNING: Length of string for control (User Name) not updated as the value/defaults specified in the script file doesn't reach the minimum range (1).

   The string given in the script is shorter than the minimum length specified in the VFR for the control. The usual cause for this is that the string has an initial empty value. This and other similar warnings will cause import to exit with an error status when running with '/r' option.

3. WARNING: Multiple instances of the setup question <Active Processor Cores> exist in the BIOS. The value for the duplicate instance of the question has not been modified (variable: Setup, GUID: ec87d643-eba4-4bb5-a1e5-3f3e36b20da, offset: 3a).

   Example: When multiple occurrences of same question is present and user tries to modify one using import command.

```
Setup Question      = Active Processor Cores
Token   =65   // Do NOT change this line
Offset  =56D
Width   =01
BIOS Default  =[00]All
MFG Default   =[00]All
Options=[00]All    // Move "*" to the desired Option
                *[01]1
                 [02]2
                 [03]3
                 [04]4
```

   And

```
Setup Question      = Active Processor Cores
Token   =67   // Do NOT change this line
Offset  =56D
Width   =01
BIOS Default  =[00]All
MFG Default   =[00]All
Options=*[00]All   // Move "*" to the desired Option
                [01]1
                 [02]2
                 [03]3
                 [04]4
```

   In this type of example where AMISCE has detected two or more controls with the same prompt here, "Active Processor Cores". These are considered to be ambiguous for UEFI 2.0. This warning will not usually appear with a UEFI2.1 BIOS because the token ID is available to distinguish one control from

another. By default AMISCE exports only one control into the script file and duplicate instances will be in commented format, if the duplicate is present.

4. Warning: HII data does not have setup question information.

   This usually means that the ALWAYS_PUBLISH_HII_RESOURCES token is not set to one. When this is the case, only partial HII data is available unless the user entered the operating environment from boot over ride.

5. WARNING : Error in creating variable xxxxxxx to NVRAM

   Where “xxxxxxx” is a variable name. This can happen when SCE attempts to create a missing variable from the copy of the variable within the StdDefaults variable. It will only try to do this if a value in the script differs from the default value. If the variable does not have the runtime attribute the write will fail if the variable is protected for security reasons. This warning commonly comes with the “SecureBootEnable” variable.

When AMISCE detects an error condition it will exit after printing the error. These are the likely errors:

1. Syntax Error in line 172

   A Typographical error has occurred in the Setup question.

   This error was generated by changing the keyword “Width” to “xWidth” on line number 172.

2. ERROR:4 - Retrieving HII Database

   This error is usually caused by absence or old version of the SmiVariable module.

3. Platform identification failed

   Indicates FIDT ACPI table could not be found. You may override this with ‘/d’ option for Aptio V. Platform identification depends on ACPI module label ‘ACPI_06’ or later for Aptio V.

***Note**: AMISCE may show multiple warnings during import, which may not be visible in single page. User can redirect the output messages to file to see the entire warning/error messages. To redirect output to file, use AMISCE <command> 2> log_file.*

3.4 Linux/BSD Pre-Requisites (does not apply to ArmSceLnx)

1. Log in Linux as root otherwise use sudo (if permitted).
2. The compiler suite (gcc, make, libelf-dev, tar) must be installed. If these packages are not installed, the driver CANNOT be built.
3. For most of the distributions, SCE will generate driver without any notification, if it doesn’t exist you need to install kernel sources. Also if Initmem fails, Please follow point 4.
4. Kernel sources must be installed, *CONFIGURED*, and then compiled. Following are steps to do this:
   a. Find Running Kernel's Configuration File:

      To configure the sources, simply change to the kernel source directory (typically /lib/modules/$(uname -r)/build). If it doesn't exist, you need to install kernel source. Typically, the reference configuration for the kernel can be found in the /boot directory with filename '.config', 'kernel.config', or 'vmlinux-2.4.18-3.config'. Type 'uname -a' and use the configuration filename that best matches the output from 'uname -a'. Also, check for /dev/mem directory existence. If it doesn’t exist, you need to install kernel sources. Normally it comes with the installation unless if the option is deselected.

On some distributions Red Hat for instance, there is a config directory under /lib/modules/$(uname -r)/build.

Copy this configuration file into the root of the Linux kernel source tree (usually it is /lib/modules/$(uname -r)/build). This file must be renamed to ".config"(dot config).

b. Make Your AMI Flash Driver (amiscedrv_mod.o):

For most distribution, the command to build the driver is:

```
SCELNX_32 /MAKEDRV
```

Or

```
SCELNX_64/MAKEDRV
```

If your Linux's kernel source tree is under /lib/modules/$(uname -r)/build, instead of being in the default path '/lib/modules/$(uname -r)/build', then add a KERNEL flag:

```
SCELNX_32 /MAKEDRV KERNEL=/lib/modules/$(uname -r)/build
```

Or

```
SCELNX_64 /MAKEDRV KERNEL=/lib/modules/$(uname -r)/build
```

If KERNEL is omitted, the default path is /lib/modules/$(uname -r)/build. This should work for MOST distributions.

***Note**: User should use /MAKEDRV to avoid building of the driver every time.*

c. Make Your AMI Flash Driver from driver source files (amiscedrv_mod.o):

Using command /GENDRV, it will generate driver source files to specific directory.

```
AMISCE_32 /GENDRV [Option 1]
```

Or

```
AMISCE_64 /GENDRV [Option 1]
```

Where,

[Option 1]: Specific kernel source 'KERNEL=XXXX' same as the /MAKEDRV

Generate files as outlined below:

File Name	Description
amiwrap.c	Driver source code.
amiwrap.h	Driver header.
amifldrvdefs.h	Driver structure definition.
amiflvdrv.o_shipped	Object file for driver.
amiflvdrv.o_shipped.cmd	Object file for driver.
Makefile	Makefile

For most distribution, the command to build the driver is: make.

If your Linux's kernel source tree is under /lib/modules/$(uname -r)/build, instead of being in the default path '/lib/modules/$(uname -r)/build', then add a KERNEL flag:

```
make KERNEL=/lib/modules/$(uname -r)/build
```

If KERNEL is omitted, the default is /lib/modules/$(uname -r)/build.

This should work for MOST distributions.

d. Check Your Build:

Check the version of running Linux kernel with 'uname -r'.

Check the version of amiscedrv_mod.o with 'modinfo amiscedrv_mod.o'.

If they mismatch, you will need to select the correct configuration

File (.config), rebuild your kernel, and then rebuild your driver as described in steps a, b, c and d.

e. Linux driver's case;

	Secure Boot Enabled	**Secure Boot Disabled**
WSMT is supported	Need Driver	No Need Driver
Can access file path:/dev/mem	Need Driver	No Need Driver
Run Time Memory Hole support	Need Driver	No Need Driver

3.4.1 REFERENCES

Linux Loadable Kernel Module HOWTO

https://access.redhat.com/documentation/enus/red_hat_enterprise_linux/8/html/managing_monitoring_and_updating_the_kernel/managing-kernel-modules_managing-monitoring-and-updating-the-kernel

3.5 Signing Driver on Linux and Enrolling Public Key to the System

The following prerequisites are needed on the build system to sign the driver:

1. Login to Linux OS as root otherwise use sudo.
2. The compiler suite (gcc, make, libelf-dev, tar) must be installed. If it's not installed, the SCE driver cannot be built.
3. OpenSSL: Needed to generate cryptographic keys. OpenSSL tool can be downloaded from https://www.openssl.org
4. Perl interpreter: Needed to run the signing script. Perl tool can be downloaded from https://www.perl.org

Follow the below steps to sign the driver:

1. Boot to the Linux OS.

2. Generate a Public and Private key pair using below openssl command:

```
> openssl req -x509 -new -nodes -utf8 -sha256 -days 36500 -batch -config
configuration_file.config -outform DER -out public_key.der  -keyout
private_key.priv
```

***Note**: The configuration file configuration_file.config must be created with the required information before running the command. A sample configuration file is shown below. The values in <> must be filled with actual values.*

```
configuration_file.config:
[ req ]
default_bits = 4096
distinguished_name = req_distinguished_name
prompt = no
string_mask = utf8only
x509_extensions = myexts

[ req_distinguished_name ]
O = <organization_name>
CN = <organization_name> Signing Key
emailAddress = <email_address>

[ myexts ]
basicConstraints=critical,CA:FALSE
keyUsage=digitalSignature
subjectKeyIdentifier=hash
authorityKeyIdentifier=keyid
```

3. Build SCE driver using below command. The driver will be generated in the current directory with name amiscedrv_mod.o.

```
> SCELNX_64 /MAKEDRV
```

4. Execute below command to sign driver with the key generated in step 2.

```
> perl /usr/src/kernels/$(uname -r)/scripts/sign-file sha256 private_key.priv
public_key.der amifldrv_mod.o
```

or

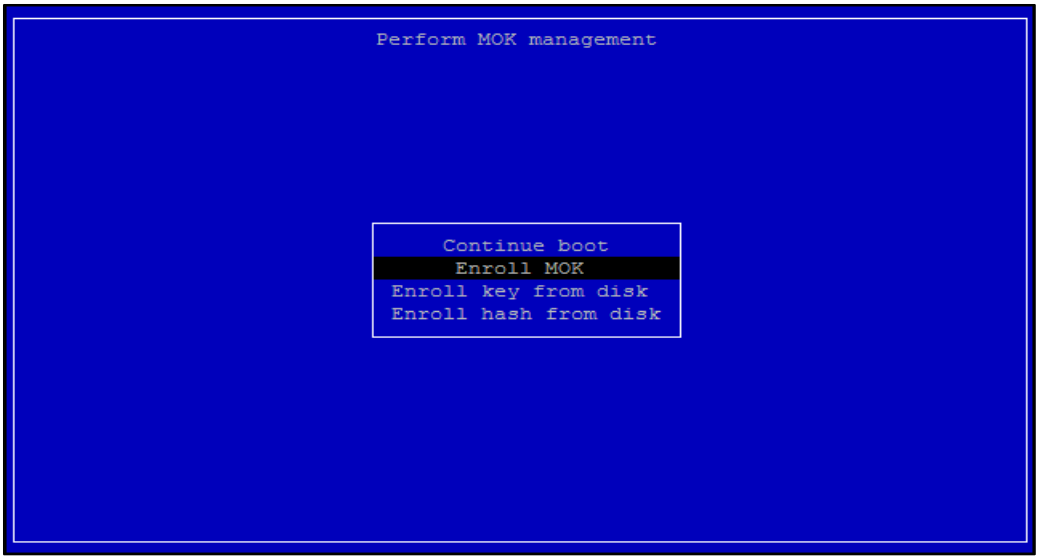
```
> /usr/src/kernels/$(uname -r)/scripts/sign-file sha256 private_key.priv
public_key.der amifldrv_mod.o
```

5. Request addition of public key to MOK list using mokutil. The command will prompt a password which will be needed during public key enrollment in next step.

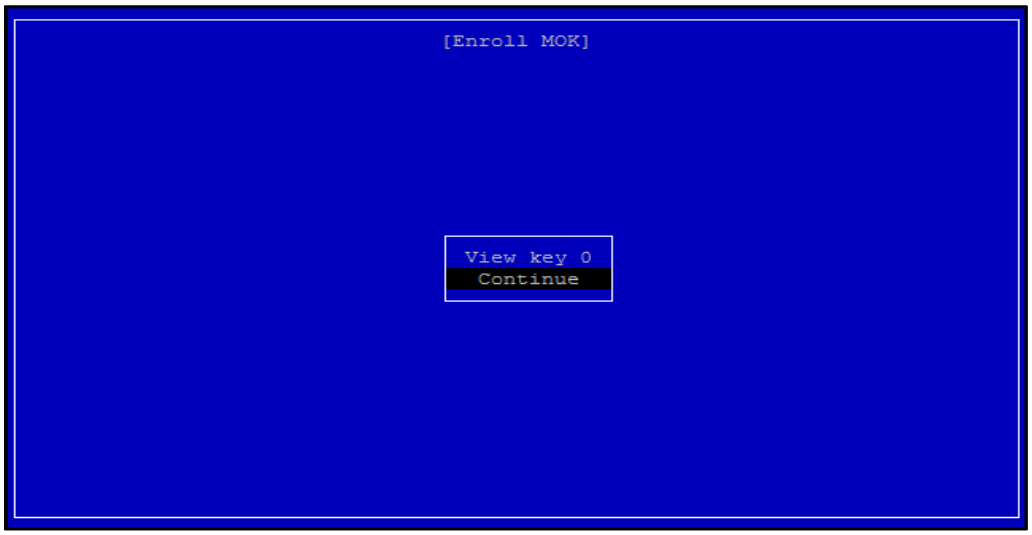
```
> mokutil --import public_key.der
```

6. Reboot the system which will launch MOK manager application to complete public key enrollment.

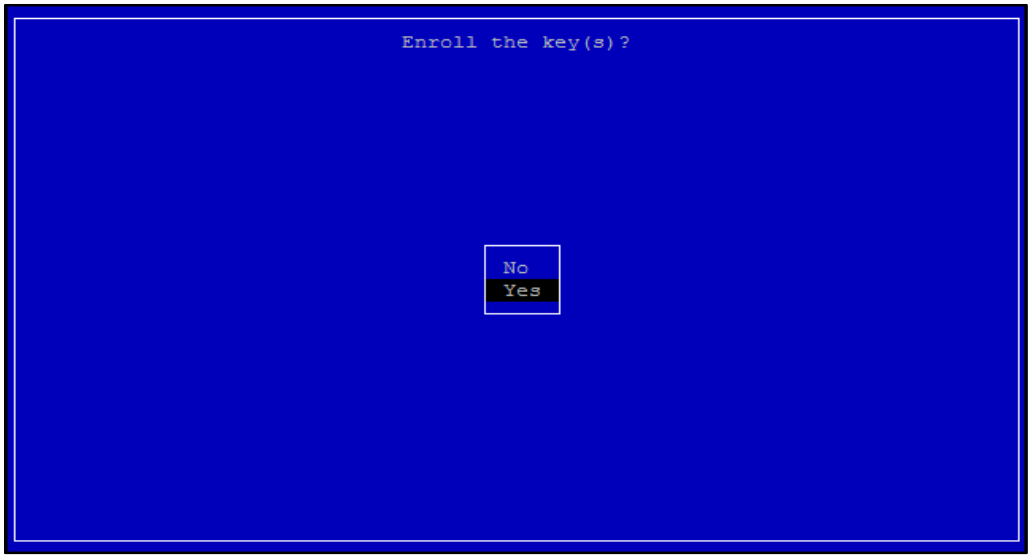
i. Select Enroll MOK.



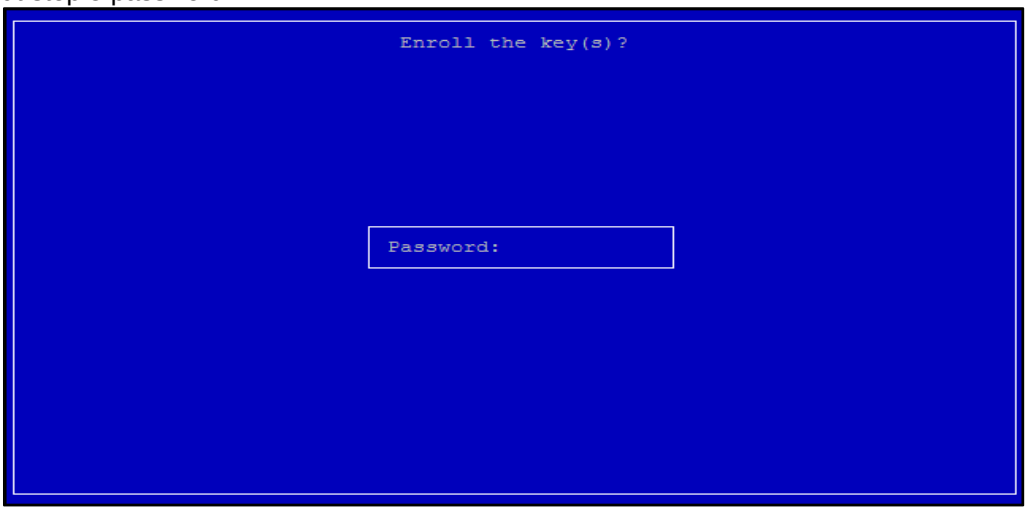
ii. Select Continue.



iii. Select Yes.



iv. Input step 5 password.



7. Once the public key enrollment is done, Boot to OS and execute below command to ensure the newly added key is available in system key ring.

```
> keyctl list %:.system_keyring
```

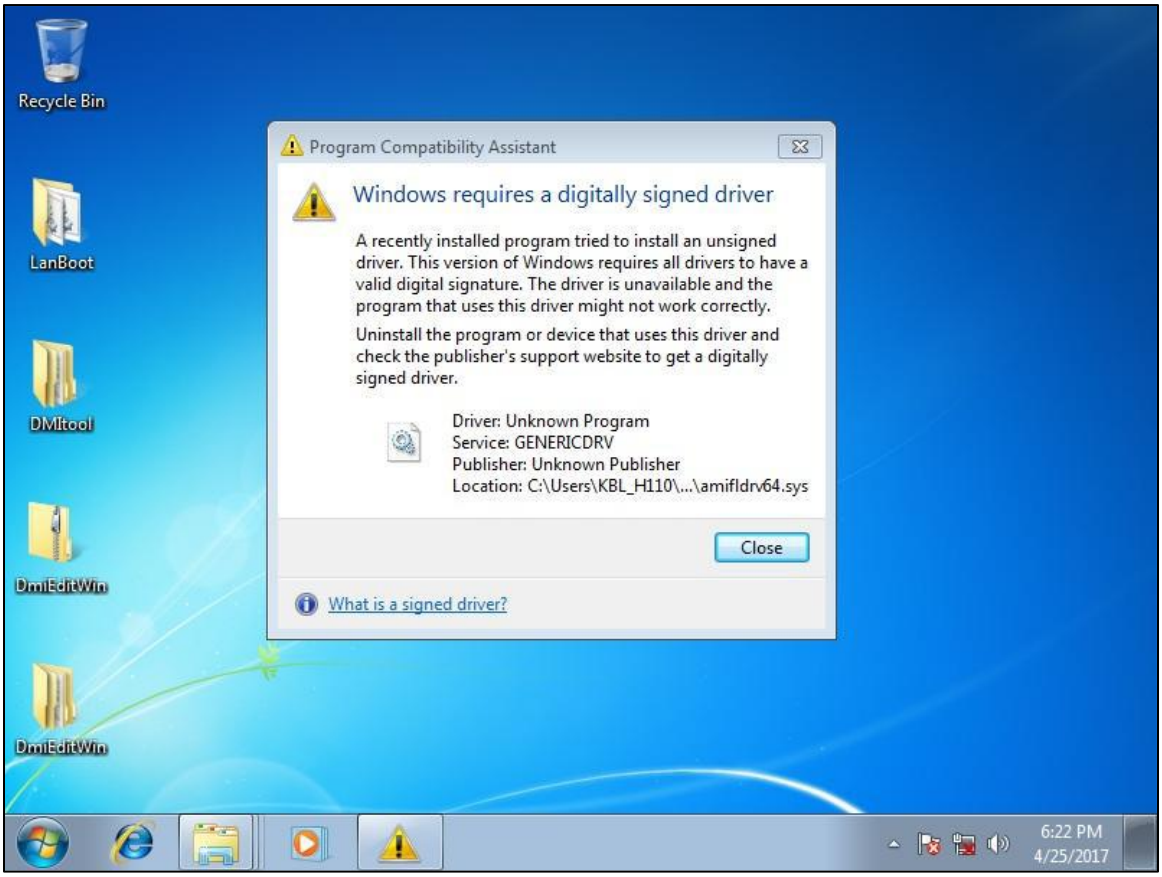
8. Install signed driver using insmod command.

```
> insmod amiscedrv_mod.o
```

9. Ensure it is loaded successfully using lsmod command.

Reference: https://access.redhat.com/documentation/en-US/Red_Hat_Enterprise_Linux/7/html/Kernel_Administration_Guide/sect-signing-kernel-modules-for-secure-boot.html

3.6 Driver Verification on Windows



The certificate used to sign the driver is higher security and older versions of Windows 7 don't support it. This issue is resolved by a security fix provided by Microsoft KB3033929.

3.7 Linux shows error when secure boot is enabled

The following error messages appear because a signed driver is required when secure boot enable.

10 - Error: Unable to load driver.

***Note**: For singing driver, please refer to Signing Driver on Linux and Enrolling Public Key to the System.*

3.8 Segmentation Fault when AMISCELNX is in kernel 3.14.40 with XEN 4.2.4

Please follow the steps below to operate the configuration, and try again.

1. Check if the system runs under X11, a.k.a GUI mode. If so, switch to console mode with the following command.

```
# systemctl set-default multi-user.target
Remember to restart system after configured.
```

2. Check if Dom0 has enough free memory.

```
# xl info
Check the item "free_memory", make sure it is larger than 1024. If the number
is lower than 1024, use the command
# xm mem-set Domain-0 1024
You don't need to restart the system after this step.
```

3. Set virtual CPU number to 1 of Domain-0 in XEN.

```
# xm vcpu-set Domain-0 1
```

4. Execute SCE commands.

3.9 SCE Exit Codes

Exit Code	Description
0x00	Operation completed successfully.
0x0D	Invalid script file or command line parameter.
0x17	Script file CRC check against current BIOS failed.
0x57	Incorrect command line usage.
0x82	Invalid password.
0x86	Admin password does not exist.
0x8F	Password retry count exceeded.
0x9A	Password does not match admin password.
0x0E	Error: Kernel source files cannot be found.
0x0F	Error: Unable to make kernel driver
0x10	Error: Unable to load driver.
0x11	Error: Unable to unload driver.
0x20	Error: Unable to initialize memory manager.
0x22	Error: Unable to allocate required memory.
0x26	Error: Unable to map physical memory.
0x61	Error: A program instance is already running.
0x71	Error: Unable to generate driver automatically when Secure Boot is enabled.