WMI Interface for Intel® NUC Products

WMI Specification – Frost Canyon

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Revision 1.0

Revision History

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1.0	First Release	28 Jyly 2020

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1. Introduction

This document provides a Specification for the WMI interface calls in select Intel® NUC products facilitating the query and control of various feature from within an operating system, such as LED Indicator.

To locate WMI object through WMI explorer or programmed code, BIOS provides a MOMF (Managed Object Format) in the ASL code.
1. WMII Object Name: "CISD_WMI"
2. GUID: 8C5DA44C-CDC3-46b3-8619-4E26D34390B7

Reference:

More information about WMI and ACPI can be found at:

https://msdn.microsoft.com/en-us/library/windows/hardware/dn614028(v=vs.85).aspx

2. Specification of LED indicator programming

2.1 Query LED Support Capability

		Description
Control method		WMAA
Arg 0		Instance
Arg 1		Method ID (03h)
Arg 2 Input Parameter	Byte 0	Function Number 00h: List all LED types support in the platform 01h: Query to know the LED Color Type for the LED type 02h: Query to know all Indicator options support for the LED type 03h: Query to know all Control items support for the Indicator option of the LED type
	Byte 1	Parameter 0 Fun(0) - No require Fun(1/2/3) - Index of LED Type (refer to **Table 2.1 LED Type**)
	Byte 2	Parameter 1 Fun(0/1/2) – No require Fun(3) – Index of Indicator option (refer to **Table 2.3 LED Indicator options**)
	Byte 3	Parameter 2 Reserved
Return Value	Byte 0	Return Code – Refers to Appendix C
	Byte 1	Return '1' to the corresponding bitmap [0:7] if corresponding type/options support in the platform Fun(0) - Refer to bit number of **Table 2.1 LED Type** Fun(1) - Refer to bit number of **Table 2.2 LED Color Type** Fun(2) - Refer to bit number of **Table 2.3 LED Indicator options** Fun(3) - Refer to bit number of **Table 2.4.x**[1] **Control items**
	Byte 2	Return '1' to the corresponding bitmap [8:15] if corresponding type/options support in the platform Fun(0) - Refer to bit number of **Table 2.1 LED Type** Fun(1) - Refer to bit number of **Table 2.2 LED Color Type** Fun(2) - Refer to bit number of **Table 2.3 LED Indicator options** Fun(3) - Refer to bit number of **Table 2.4.x**[1] **Control items**
	Byte 3	Return '1' to the corresponding bitmap [16:23] if corresponding type/options support in the platform Fun(0) - Refer to bit number of **Table 2.1 LED Type**

		Description
		Fun(1) - Refer to bit number of **Table 2.2 LED Color Type**
		Fun(2) - Refer to bit number of **Table 2.3 LED Indicator options**
		Fun(3) - Refer to bit number of **Table 2.4.x**[1] **Control items**

Note:

1. If LED color type is either dual color LED or RGB color LED, refers to the table 2.4.x with the table title end of multi-color LED. If the LED type is single color LED, refers to the table 2.4.x with the table title end of single-color LED

2.2 New Get LED Status

		Description
Control method		WMAA
Arg 0		Instance
Arg 1		Method ID (04h)
Arg 2 Input Parameter	Byte 0	Function Number 00h: Get current Indicator option for the LED type 01h: Get current setting for the control item of the Indicator option and the LED type
	Byte 1	Parameter 0 Index of LED Type (refer to **Table 2.1 LED Type**)
	Byte 2	Parameter 1 Fun(0) - No require Fun(1) - Index of Indicator option (refer to **Table 2.3 LED Indicator options**)
	Byte 3	Parameter 2 Fun(0) - No require Fun(1) - Index of Control item (refer to **Table 2.4.x**[1] **Control items)**
Return Value	Byte 0	Return Code – Refers to Appendix C
	Byte 1	Fun(0) – Return current Indicator option for the LED type (refer to **Table 2.3 LED Indicator options**) Fun(1) – Return current setting for the control item of the Indicator option and the LED type (refer to **Table 2.4.x**[1] **Control items**)
	Byte 2	Reserved
	Byte 3	Reserved

Note:

1. If LED color type is either dual color LED or RGB color LED, refers to the table 2.4.x with the table title end of multi-color LED. If the LED type is single color LED, refers to the table 2.4.x with the table title end of single-color LED

2.3   Set an indicator option for the LED type

		Description
Control method		WMAA
Arg 0		Instance
Arg 1		Method ID (05h)
Arg 2 Input Parameter	Byte 0	Parameter 0 Index of LED Type (refer to **Table 2.1 LED Type**)
	Byte 1	Parameter 1 Index of Indicator option (refer to **Table 2.3 LED Indicator options**)
	Byte 2	Parameter 2 No require
	Byte 3	Parameter 3 No require
Return Value	Byte 0	Return Code – Refers to Appendix C
	Byte 1	Reserved
	Byte 2	Reserved
	Byte 3	Reserved

2.4   Set the value to the control item of the indicator option and the LED type

		Description
Control method		WMAA
Arg 0		Instance
Arg 1		Method ID (06h)
Arg 2 Input Parameter	Byte 0	Parameter 0 Index of LED Type (refer to **Table 2.1 LED Type**)
	Byte 1	Parameter 1 Index of Indicator option (refer to **Table 2.3 LED Indicator options**)
	Byte 2	Parameter 2 Index of Control item (refer to **Table 2.4.x[1] Control items**)
	Byte 3	Parameter 3 Control item value (refer to **Table 2.4.x[1] Control items**)
Return Value	Byte 0	Return Code – Refers to Appendix C
	Byte 1	Reserved
	Byte 2	Reserved

		Description
	Byte 3	Reserved

Note:
1. If LED color type is either dual color LED or RGB color LED, refers to the table 2.4.x with the table title end of multi-color LED. If the LED type is single color LED, refers to the table 2.4.x with the table title end of single-color LED

2.5   Notification of LED App

		Description
		Description
Control method		WMAA
Arg 0		Instance
Arg 1		Method ID (07h)
Arg 2 Input Parameter	Byte 0	Function Number 01h – Notification for saving all LED configurations
	Byte 1	Parameter 1 No require
	Byte 2	Parameter 2 No require
	Byte 3	Parameter 3 No require
Return Value	Byte 0	Return Code – Refers to Appendix C
	Byte 1	Reserved
	Byte 2	Reserved
	Byte 3	Reserved

2.6   Switch LED Type

		Description
		Description
Control method		WMAA
Arg 0		Instance
Arg 1		Method ID (08h)
Arg 2 Input Parameter	Byte 0	LED Type 01h – Single color LED 02h – Multi color LED
	Byte 1	Parameter 1 Not required

	Byte 2	Parameter 2 Not required
	Byte 3	Parameter 3 Not required
Return Value	Byte 0	Return Code – Refers to Appendix C
	Byte 1	Reserved
	Byte 2	Reserved
	Byte 3	Reserved

2.7   Version Control

		Description
Control method		WMAA
Arg 0		Instance
Arg 1		Method ID (09h)
Arg 2 Input Parameter	Byte 0	Function Number 01h – Return the version number of the WMI interface spec compliance
	Byte 1	Parameter 1 Not required
	Byte 2	Parameter 2 Not required
	Byte 3	Parameter 3 Not required
Return Value	Byte 0	Return Code – Refers to Appendix C
	Byte 1	0x0126
	Byte 2	
	Byte 3	Reserved

This function call is used to the utility/app which version of the WMI interface specification the BIOS follows

Reference table

Table 2.1 LED Type

Bit Number	Index	Type
0	0	Power Button LED
1	1	HDD LED

2	2	Skull LED
3	3	Eyes LED
4	4	Front LED1
5	5	Front LED2
6	6	Front LED3

Table 2.2 LED Color Type

Bit Number	Type
0	Dual-color Blue / Amber
1	Dual-color Blue / White
2	RGB-color
3	Single-color LED

Table 2.3 LED Indicator options (Usage type)

Bit Number	Index	Options
0	0	Power State Indicator
1	1	HDD Activity Indicator
2	2	Ethernet Indicator
3	3	WiFi Indicator
4	4	Software Indicator
5	5	Power Limit Indicator
6	6	Disable

Table 2.4.1A Control items of Power State Indicator of multi-color LED

Bit Number	Index	Control Item	Options	
0	0	S0 Indicator Brightness	00h/0% ~ 64h/100% (1% increments up to 100%)	
1	1	S0 Indicator Blinking Behavior	Index	Options
			0	Solid
			1	Breathing
			2	Pulsing
			3	Strobing
2	2	S0 Indicator Blinking Frequency	01h/0.1Hz ~ 0Ah/1.0Hz (0.1Hz increments up to 1.0Hz)	

Bit Number	Index	Control Item	Options
3	3	S0 Indicator Color	For LED Color Type - Dual-color Blue / Amber | Index	Options
---	---
0	Blue
1	Amber	 For LED Color Type - Dual-color Blue / White 	Index	Options
---	---
0	Blue
1	White	 For LED Color Type - RGB-color RED[7:0] - RGB color space
4	4	S0 Indicator Color 2	For LED Color Type - RGB-color GREEN[7:0] - RGB color space
5	5	S0 Indicator Color 3	For LED Color Type - RGB-color BLUE[7:0] - RGB color space
6	6	S3 Indicator Brightness	same above
7	7	S3 Indicator Blinking Behavior	same above
8	8	S3 Indicator Blinking Frequency	same above
9	9	S3 Indicator Color	same above
10	A	S3 Indicator Color 2	same above
11	B	S3 Indicator Color 3	same above
12	C	Modern Standby Indicator Brightness	same above
13	D	Modern Standby Indicator Blinking Behavior	same above
14	E	Modern Standby Indicator Blinking Frequency	same above
15	F	Modern Standby Indicator Color	same above
16	10	Modern Standby Indicator Color 2	same above
17	11	Modern Standby Indicator Color 3	same above
18	12		
19	13		
20	14		
21	15		
22	16		

Bit Number	Index	Control Item	Options
23	17		

Table 2.4.1B Control items of Power State Indicator of single-color LED

Bit Number	Index	Control Item	Options
0	0	S0 Indicator Brightness	<table><tr><th>Index</th><th>Options</th></tr><tr><td>0</td><td>OFF</td></tr><tr><td>1</td><td>50%</td></tr><tr><td>2</td><td>100%</td></tr></table>
1	1	S0 Indicator Blinking Behavior	<table><tr><th>Index</th><th>Options</th></tr><tr><td>0</td><td>1Hz</td></tr><tr><td>1</td><td>0.25Hz</td></tr><tr><td>2</td><td>1Hz Fade</td></tr><tr><td>3</td><td>0.25Hz Fade</td></tr><tr><td>4</td><td>Always On</td></tr></table>
2	2	S3 Indicator Brightness	<table><tr><th>Index</th><th>Options</th></tr><tr><td>0</td><td>OFF</td></tr><tr><td>1</td><td>50%</td></tr><tr><td>2</td><td>100%</td></tr></table>
3	3	S3 Indicator Blinking Behavior	<table><tr><th>Index</th><th>Options</th></tr><tr><td>0</td><td>1Hz</td></tr><tr><td>1</td><td>0.25Hz</td></tr><tr><td>2</td><td>1Hz Fade</td></tr><tr><td>3</td><td>0.25Hz Fade</td></tr><tr><td>4</td><td>Always On</td></tr></table>

Table 2.4.2A Control items of HDD activity Indicator of multi-color LED

Bit Number	Index	Control Item	Options
0	0	Brightness	00h/0% ~ 64h/100% (1% increments up to 100%)

Bit Number	Index	Control Item	Options
1	1	Color	For LED Color Type - Dual-color Blue / Amber <table><tr><th>Index</th><th>Options</th></tr><tr><td>0</td><td>Blue</td></tr><tr><td>1</td><td>Amber</td></tr></table> For LED Color Type - Dual-color Blue / White <table><tr><th>Index</th><th>Options</th></tr><tr><td>0</td><td>Blue</td></tr><tr><td>1</td><td>White</td></tr></table> For LED Color Type - RGB-color RED[7:0] - RGB color space
2	2	Color 2	For LED Color Type - RGB-color GREEN[7:0] - RGB color space
3	3	Color 3	For LED Color Type - RGB-color BLUE[7:0] - RGB color space
4	4	Behavior	<table><tr><th>Index</th><th>Options</th></tr><tr><td>0</td><td>Normally off, ON when active</td></tr><tr><td>1</td><td>Normally on, OFF when active</td></tr></table>

Table 2.4.2B Control items of HDD activity Indicator of single-color LED

Bit Number	Index	Control Item	Options
0	0	Brightness	<table><tr><th>Index</th><th>Options</th></tr><tr><td>0</td><td>OFF</td></tr><tr><td>1</td><td>50%</td></tr><tr><td>2</td><td>100%</td></tr></table>
1	1	Behavior	<table><tr><th>Index</th><th>Options</th></tr><tr><td>0</td><td>Normally off, ON when active</td></tr><tr><td>1</td><td>Normally on, OFF when active</td></tr></table>

Table 2.4.3 Control items of Ethernet Indicator of multi-color LED

Bit Number	Index	Control Item	Options
0	0	Type	Index / Options: 0 — LAN1 1 — LAN2 2 — LAN1 + LAN2
1	1	Brightness	00h/0% ~ 64h/100% (1% increments up to 100%)
2	2	Color	For LED Color Type - Dual-color Blue / Amber Index / Options: 0 — Blue 1 — Amber For LED Color Type - Dual-color Blue / White Index / Options: 0 — Blue 1 — White For LED Color Type - RGB-color RED[7:0] - RGB color space
3	3	Color 2	For LED Color Type - RGB-color GREEN[7:0] - RGB color space
4	4	Color 3	For LED Color Type - RGB-color BLUE[7:0] - RGB color space

Table 2.4.4 Control items of WiFi Indicator of multi-color LED

Bit Number	Index	Control Item	Options
0	0	Brightness	00h/0% ~ 64h/100% (1% increments up to 100%)
1	1	Color	For LED Color Type - Dual-color Blue / Amber Index / Options: 0 — Blue 1 — Amber For LED Color Type - Dual-color Blue / White Index / Options

			0 Blue
			1 White
			For LED Color Type - RGB-color RED[7:0] - RGB color space
2	2	Color 2	For LED Color Type - RGB-color GREEN[7:0] - RGB color space
3	3	Color 3	For LED Color Type - RGB-color BLUE[7:0] - RGB color space

Table 2.4.5A Control items of Software Indicator of multi-color LED

Bit Number	Index	Control Item	Options
0	0	Brightness	00h/0% ~ 64h/100% (1% increments up to 100%)
1	1	Blinking Behavior	Index Options 0 Solid 1 Breathing 2 Pulsing 3 Strobing
2	2	Blinking Frequency	01h/0.1Hz ~ 0Ah/1.0Hz (0.1Hz increments up to 1.0Hz)
3	3	Color	For LED Color Type - Dual-color Blue / Amber Index Options 0 Blue 1 Amber For LED Color Type - Dual-color Blue / White Index Options 0 Blue 1 White For LED Color Type - RGB-color RED[7:0] - RGB color space
4	4	Color 2	For LED Color Type - RGB-color GREEN[7:0] - RGB color space
5	5	Color 3	For LED Color Type - RGB-color BLUE[7:0] - RGB color space

Table 2.4.6B Control items of Software Indicator of single-color LED

Bit Number	Index	Control Item	Options
0	0	Brightness	<table><tr><td>Index</td><td>Options</td></tr><tr><td>0</td><td>OFF</td></tr><tr><td>1</td><td>50%</td></tr><tr><td>2</td><td>100%</td></tr></table>
1	1	Blinking Behavior	<table><tr><td>Index</td><td>Options</td></tr><tr><td>0</td><td>1Hz</td></tr><tr><td>1</td><td>0.25Hz</td></tr><tr><td>2</td><td>1Hz Fade</td></tr><tr><td>3</td><td>0.25Hz Fade</td></tr><tr><td>4</td><td>Always On</td></tr></table>

Table 2.4.7 Control items of Power Limit Indicator of multi-color LED

Bit Number	Index	Control Item	Options
0	0	Indication Scheme	<table><tr><td>Index</td><td>Options</td></tr><tr><td>0</td><td>Green to Red</td></tr><tr><td>1</td><td>Single Color</td></tr></table>
1	1	Brightness (for Green to Red)	00h/0% ~ 64h/100% (1% increments up to 100%)
2	2	Color (For Single Color)	For LED Color Type - Dual-color Blue / Amber <table><tr><td>Index</td><td>Options</td></tr><tr><td>0</td><td>Blue</td></tr><tr><td>1</td><td>Amber</td></tr></table> For LED Color Type - Dual-color Blue / White <table><tr><td>Index</td><td>Options</td></tr><tr><td>0</td><td>Blue</td></tr><tr><td>1</td><td>White</td></tr></table> For LED Color Type - RGB-color RED[7:0] - RGB color space
3	3	Color 2 (For Single Color)	For LED Color Type - RGB-color GREEN[7:0] - RGB color space
4	4	Color 3 (For Single Color)	For LED Color Type - RGB-color

			BLUE[7:0] - RGB color space

Appendix C – Error Code Definition

Error Code	Description
00h	No Error
E1h	Function not support
E2h	Undefined device
E3h	EC no respond
E4h	Invalid Parameter
E5h	Node busy. Command could not be executed because command processing resources are temporarily unavailable
E6h	Command execution failure. Parameter is illegal because destination device has been disabled or is unavailable
E7h	Invalid CEC Opcode
E8h	Data Buffer size is not enough
EFh	Unexpected error
Others	Reserved