

Dell NC-SI OEM Commands for SmartNICs

Abstract

This is a contribution of Dell NC-SI OEM commands used to coordinate power up and power down of a SmartNIC with a server using Dell NC-SI OEM commands.

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Revisions

Date	Description
September 2023	Initial release
October 2023	Updated language for some reserved fields to say they are undefined.

Acknowledgments

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Support:

Other:

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Executive summary

The following Dell NC-SI OEM commands are provided to enable coordinated boot and shutdown between a server managed by a BMC and XPU see <https://github.com/opiprject/opi-prov-life/blob/main/boot/COORDINATION.md#3-out-band-via-platform-bmc>

1 Implementation

In accordance with the scheme defined in the NC-SI Specification, the commands defined in this specification are treated as OEM commands and are delivered with the Dell Manufacturer ID of 674 (0x02A2) the NC-SI OEM command and response header.

1.1 Command Packet

The following diagram is the general format of a NC-SI Dell OEM Command.

	Bits			
Bytes	31..24	23..16	15..08	07..00
00..15	Standard NC-SI Header			
16..19	0x0000		Dell Manufacturer ID (0x02A2)	
20..23	Payload Version	Command ID	Data	
28....	Data			
....	Checksum (3..2)		Checksum (1..0)	
....	Pad			

1.2 Response Packet Payload

Unlike command packets that do not necessarily contain payload data, all response packets carry at least a 4-byte payload. This payload carries the response and reason code that provide status on the outcome of processing the originating command packet and is present in all response packet payload definitions. The default payload occupies bytes 00..03 of the response packet payload, with any additional response-packet-specific payload defined to follow starting on the next word. Additional considerations are listed below.

	Bits			
Bytes	31..24	23..16	15..08	07..00
00..15	Standard NC-SI Header			
16..19	Response Code		Reason Code	
20..23	0x0000		Dell Manufacturer ID (0x02A2)	
24..27	Payload Version	Dell Command ID	Data	
28....	Data			
....	Checksum (3..2)		Checksum (1..0)	
....	Pad			

1.3 Payload Version

This 1-byte field identifies the version of the payload in OEM command and response packets. For this version of the specification, the payload version is 0x02.

1.4 Command ID

This 1-byte field contains the Command Identifier that is used to identify specific Dell OEM commands and responses. Each command is assigned a unique 8-bit command type value in the range 0x00..0xFF. The response packet for each command will carry the same command ID as the original command packet. This allows for a one-to-one correspondence between commands and responses.

1.5 Response Code

Standard NC-SI response codes defined in the DMTF NC-SI specification.

1.6 Reason Code

Standard NC-SI reason codes defined in the DMTF NC-SI specification.

1.7 Checksum

Checksums in the OEM command and response packets should use a 2s complement checksum as defined in the DMTF NC-SI specification 1.0.0 section 8.2.2.3.

2 Command Details

Command details are in the subsections below.

2.1 Get Status Command (0x30)

The Get Status Command allows the Management Controller to query for the status, specifically smartNIC boot and OS status.

	Bits			
Bytes	31..24	23..16	15..08	07..00
00..15	Standard NC-SI Header			
16..19	0x0000		Dell Manufacturer ID (0x02A2)	
20..23	Version (0x02)	Command (0x30)	Reserved (0x00)	Reserved (0x00)
24..27	Checksum			
....	Pad			

Table 1 Get Status Command Packet Format

2.2 Get Status Response (0x30)

The Get Status response shall contain SN State.

Note: Undefined fields are not defined in this document and may contain non-zero values. Use 0x00 in these fields unless instructed otherwise.

	Bits			
Bytes	31..24	23..16	15..08	07..00
00..15	Standard NC-SI Header			
16..19	Response Code		Reason Code	
20..23	0x0000		Dell Manufacturer ID (0x02A2)	
24..27	Version (0x02)	Command (0x30)	Undefined (0x00)	
28..31	Undefined (0x00)		Undefined (0x00)	SN State
32..35	Undefined (0x00)			
28..31	Checksum (3..2)		Checksum (1..0)	
....	Pad			

Table 2 Get Status Response Packet

The following table defines the SN State values.

Value	Name	Description
0	Reset	CPU is in reset / Boot ROM

1	Firmware #1	CPU has passed FW checkpoint 1
2	Firmware #2	CPU has passed FW checkpoint 2
3	UEFI	CPU has entered UEFI
4	OS Booting	CPU has entered OS
5	OS Running	OS is running
6	OS Halted/Shutdown	OS is halted or shutdown
7	Updating	Update in Progress
8	OS Crash Progressing	OS Crash Dump in progress
9	OS Crash Complete	OS Crash Dump complete
Other	Reserved	Reserved

Table 3 SN State Field

2.3 Force SmartNIC Reset Command (0x42)

The Force SmartNIC Reset Command allows the Management Controller to send to the SmartNIC a command to reset the embedded CPU or the entire device. Force SmartNIC Reset is a package command.

	Bits			
Bytes	31..24	23..16	15..08	07..00
00..15	Standard NC-SI Header			
16..19	0x0000		Dell Manufacturer ID (0x02A2)	
20..23	Version (0x02)	Command (0x42)	Reserved (0x00)	Reset
24..27	Checksum			
....	Pad			

Table 4 Force SmartNIC Reset Command Packet Format

The following table defines the Reset values.

Bit	Label	Values
0	Sync	0b = reset begins after sending the command response 1b = reset begins when PERST# is asserted low
1..6	Reserved	0
7	Mode	0b = CPU only reset 1b = Full device reset

Table 5 Reset Field

2.4 Force SmartNIC Reset Response (0x42)

In the absence of any errors, the channel shall process and respond to the Force SmartNIC Reset Command and send the response packet shown.

	Bits			
Bytes	31..24	23..16	15..08	07..00
00..15	Standard NC-SI Header			
16..19	Response Code		Reason Code	
20..23	0x0000		Dell Manufacturer ID (0x02A2)	
24..27	Version (0x02)	Command (0x42)	Reserved (0x00)	
28..31	Checksum (3..2)		Checksum (1..0)	
....	Pad			

Table 6 Force SmartNIC Reset Response Packet Format

2.5 Send SmartNIC Interrupt Command (0x43)

The Send SmartNIC Interrupt Command allows the Management Controller to send to the SmartNIC CPU a high-priority interrupt request. Send SmartNIC Interrupt is a package command.

	Bits			
Bytes	31..24	23..16	15..08	07..00
00..15	Standard NC-SI Header			
16..19	0x0000		Dell Manufacturer ID (0x02A2)	
20..23	Version (0x02)	Command (0x43)	Reserved (0x00)	Type
24..27	Checksum			
....	Pad			

Table 7 Set SmartNIC Interrupt Command Packet Format

The following table defines the Interrupt type values.

Value	Name	Description
1	NMI	Assert an NMI signal to the SmartNIC (optional)
2	Shutdown	Assert a signal to the SmartNIC to cause it to gracefully shutdown
All Other	Reserved	Reserved

Table 8 Type Field

2.6 Send SmartNIC Interrupt Response (0x43)

In the absence of any errors, the channel shall process and respond to the Send SmartNIC Interrupt Command and send the response packet shown.

	Bits			
Bytes	31..24	23..16	15..08	07..00
00..15	Standard NC-SI Header			
16..19	Response Code		Reason Code	
20..23	0x0000		Dell Manufacturer ID (0x02A2)	
24..27	Version (0x02)	Command (0x43)	Pad (0x00)	
28..31	Checksum (3..2)		Checksum (1..0)	
....	Pad			

Table 9 Send SmartNIC Interrupt Response Packet Format