

This is a proposal of how to document the new Extended Device Control (09h) and Extended Device Control Response (0Ah) R_CTL Information categories as generic Device Control functions to make the architecture easily extended in the future without the need to define more R_CTL information categories in FC-FS standards. It provides FC-NVMe and FCP standards to freely define their own device control functions.

Define SRR and SRR Response as NVMeoFC Control functions:

Table 31 – NVMe over FC Information Units (IUs) sent to target NVMe_Ports

IU	Description	Data block		F/M/L	SI	M/O
		R_CTL field	Content			
T1	Command request	06h	NVMe_CMND	F	T	M
T2 ^a	Command request	06h	NVMe_CMND	F	H	O
T3	Data-Out action	01h	NVMe_DATA	M	T	M
T4 ^b	Confirm	03h	NVMe_CONF	L	T	O
T5	Sequence Retransmission request	09h	NVMe_SR	M	T	O
Key: IU Information Unit identifier Content Contents (payload) of data block F/M/L First/Middle/Last Sequence of Exchange (FC-FS-6) F First M Middle L Last SI Sequence Initiative: Held or Transferred (FC-FS-6) H Held T Transferred M/O Mandatory/Optional Sequence M Mandatory O Optional						
a T2 is only permitted if first burst is used on the command. b T4 is only permitted in response to an I4 or I6 frame (see table 32).						

Change

T5	Sequence Retransmission request	09h	NVMe_SR	M	T	O
----	---------------------------------	-----	---------	---	---	---

To

T5	Device Control IU	09h	See 9.8	M	T	O
----	-------------------	-----	---------	---	---	---

Table 32 – NVMe over FC Information Units (IUs) sent to initiator NVMe_Ports

IU	Description	Data block		F/M/L	SI	M/O
		R_CTL field	Content			
I1	Data-Out delivery request	05h	NVMe_XFER_RDY (Write)	M	T	M
I2 ^b	Data-In action	01h	NVMe_DATA	M	H	M
I3	Command response	07h	NVMe_RSP	L	T	M
I4 ^a	Command response (NVMe_CONF IU request)	07h	NVMe_RSP	M	T	O
I5	Extended response	08h	NVMe_ERSP	L	T	M
I6 ^a	Extended response (NVMe_CONF IU request)	08h	NVMe_ERSP	M	T	O
I7	Sequence Retransmission response	0Ah	NVMe_SR_RSP	M	H	O
Key: IU Information Unit identifier Content Contents (payload) of data block F/M/L First/Middle/Last Sequence of Exchange (FC-FS-6) F First M Middle L Last SI Sequence Initiative: Held or Transferred (FC-FS-6) H Held T Transferred M/O Mandatory/Optional Sequence M Mandatory O Optional						
a I4 or I6 is requested by not setting First/Middle/Last Sequence of Exchange (see FC-FS-6) to Last. b I2 allows optional Sequence streaming to I2, I3, I4, I5, or I6.						

Change

I7	Sequence Retransmission response	0Ah	NVMe_SR_RSP	M	H	O
----	----------------------------------	-----	-------------	---	---	---

To

I7	Device Control response IU	0Ah	See 9.8	M	H	O
----	----------------------------	-----	---------	---	---	---

Insert new subclause:

9.8 NVMe over FC Device Control IUs

9.8.1 Overview

Device Control IUs use the Extended Unsolicited Control and Extended Solicited Control Device_Data information categories of the R_CTL field (see FC-FS-6) to provide device-level control functions within NVMeoFC exchanges.

For NVMeoFC FC-4 Device Control IUs, the Frame_Header fields (see 5) shall be set as follows:

- a) R_CTL Routing field (word 0, bits 31-28) shall be set to 0000b (i.e., a Device_Data frame);
- b) the TYPE field shall be set to 08h (i.e., FC-NVMe FC-4 Device frame); and
- c) the R_CTL Information field (word 0, bits 27-24) shall be set to 1001b (i.e., extended unsolicited control) for request sequences or 1010b (i.e. extended solicited control) for response Sequences.

The format of an NVMe over FC Device Control IU is specified in table X.

Table X

bit word				
0	FC ID	Control IU Opcode	Control IU Payload	
1-n	Control IU Payload			

FC ID: The FC ID field represents the FC-4 Type value defining the control IU and shall be set to 28h to indicate the FC-NVMe FC-4 Type.

Control IU Opcode: The Control IU Opcode defines the type and content of the Device Control IU. The opcodes are defined in table Y.

Table Y:

Opcode	Control Function IU	Reference
00h	reserved	
01h	Sequence Retransmission Request (NVMe_SR_IU)	9.8.2
02h	Sequence Retransmission Response (NVMe_SR_RSP_IU)	9.8.3
All others	reserved	

Bump these subclauses down one level:

9.8.2 NVMe_SR IU format

...

9.8.3 NVMe_SR_RSP IU format

...

Proposal for describing NVMeoFC Device Control IUs
Roger Hathorn (IBM)

Based on FC-NVMe-2 Rev 1.05
T11/2019-00240-v001