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Draft**

**Serial ATA  
International Organization**

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**Serial ATA Revision 3.4 Technical Proposal # 085  
D224**

**Title : Digital: Define/Use Ordered NCQ  
command(s)**

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## Document History

Version	Date	Comments
0	April 20, 2019	Initial version.
1	April 29, 2019	Corrected cut and paste errors in 13.6.7 RECEIVE FPDMA QUEUED command and subcommand and 13.6.8 SEND FPDMA QUEUED command and subcommand
2	June 24, 2019	Made changes requested by the 24 June SATA-IO Digital working group.
3	June 27, 2019	Corrected a nagging typo in 13.6.6.10.1.

## Introduction (Not part of any proposed text)

In SATA 3.2, Technical Proposal D118 added a “sequential NCQ command” and clearly described it as being different from a SCSI ordered command in the following ways.

- The NCQ behaviors apply only in a SATA-specific queued environment, which is not universal in SATA and does not exist at all in PATA. The SCSI behaviors are specified in the architecture model and are universal to all SCSI transports.
- The NCQ behaviors apply only to those commands to which the SATA specification attaches them. The SCSI behaviors are specified in the architecture model and are applicable to all SCSI commands.
- Processing of a sequential NCQ command is ordered only with respect to other sequential NCQ commands. SCSI Ordered commands are delivered to the device server in sequence with respect to all other commands received by the SCSI target device.

The last bullet above defines the motivation for this proposal. Sequential NCQ commands are ordered only with respect to other sequential NCQ commands.

In the SCSI definition of Zone Domains and Realms, the ZONE ACTIVATE command needs to be processed as a SCSI Ordered command to prevent adverse interactions with read commands and write commands.

When ZONE ACTIVATE EXT is delivered encapsulated in a RECEIVE FPDMA QUEUED command, the same NCQ ordering is needed to fully match ATA behaviors to SCSI behaviors.

Using the sequential NCQ command as a model, this proposal defines an ordered NCQ command for exactly this purpose.

## 1 Technical Specification Changes

### 1.1 <Title of section being changed>

editor note:

- Existing text is black.
- New text is marked as underlined in blue color.
- Material to be deleted ~~is red with strikethrough markings~~.
- **<<.. indicates editorial text ..>>**
- **Indicates that reference or code value may change when integrated**

## 4 Definitions, abbreviations, and conventions

### 4.1 Terminology

#### 4.1.1 Definitions and abbreviations

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##### 4.1.1.73 immediate NCQ command

An immediate ~~native command queuing (NCQ)~~ command is an NCQ command that ~~shall~~ is defined to be processed:

- a) after any ...

<<...>>

##### 4.1.1.1024 ordered NCQ command

An ordered NCQ command is an NCQ command that is defined to be processed:

- a) after any NCQ commands previously accepted by the device have completed processing;  
and
- b) before any NCQ commands subsequently accepted by the device have begun processing.

<<...>>

##### 4.1.1.116 sequential NCQ command

A sequential NCQ command is an NCQ command ~~for which the following rule applies. A sequential NCQ command shall~~ that is defined to be processed:

- a) after any ...

<<...>>

## 13.6.6 NCQ NON-DATA command

### 13.6.6.1 NCQ NON-DATA command definition

The NCQ NON-DATA command transports queued subcommands to the device that do not require any data transfer.

Some NCQ NON-DATA subcommands (see ACS-5) are processed as immediate NCQ commands (see 4.1.1.73). Some NCQ NON-DATA subcommands (see ACS-5) are processed as ordered NCQ commands (see 4.1.1.1024).

<<...>>

### 13.6.6.10 ZAC MANAGEMENT OUT subcommand (7h)

#### 13.6.6.10.1 ZAC MANAGEMENT OUT subcommand overview

The ZAC ~~MANAGEMENT~~ MANAGEMENT OUT subcommand functionality and behavior is defined in ACS-4.

Some ZAC MANAGEMENT OUT subcommands (see ZAC-2) are processed as ordered NCQ commands (see 4.1.1.1024).

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### **13.6.7 RECEIVE FPDMA QUEUED command and subcommand**

#### **13.6.7.1 RECEIVE FPDMA QUEUED command definition**

The 512 Byte Block DMA IN subcommands make use of this transport command. The RECEIVE FPDMA QUEUED command supports LBA mode only and uses 48 bit addressing only. The format of the command is defined in Figure 374.

Some RECEIVE FPDMA QUEUED subcommands ([see ACS-5](#)) are processed as sequential NCQ commands (see 4.1.1.116). [Some RECEIVE FPDMA QUEUED subcommands \(see ACS-5\) are processed as ordered NCQ commands \(see 4.1.1.1024\).](#)

<<...>>

#### **13.6.7.7 ZAC MANAGEMENT IN subcommand (02h)**

##### **13.6.7.7.1 ZAC MANAGEMENT IN subcommand overview**

The ZAC MANAGEMENT IN subcommand functionality and behavior is defined in ACS-4.

[Some ZAC MANAGEMENT IN subcommands \(see ZAC-2\) are processed as ordered NCQ commands \(see 4.1.1.1024\).](#)

<<...>>

### **13.6.8 SEND FPDMA QUEUED command and subcommand**

#### **13.6.8.1 SEND FPDMA QUEUED command definition**

The 512 Byte Block DMA OUT subcommands make use of this transport command. The SEND FPDMA QUEUED command supports LBA mode only and uses 48 bit addressing only. The format of the command is defined in Figure 380.

Some SEND FPDMA QUEUED subcommands ([see ACS-5](#)) are processed as sequential NCQ commands (see 4.1.1.116). [Some SEND FPDMA QUEUED subcommands are \(see ACS-5\) processed as ordered NCQ commands \(see 4.1.1.1024\).](#)

<<...>>

#### **13.6.8.9 ZAC MANAGEMENT OUT subcommand (03h)**

##### **13.6.8.9.1 ZAC MANAGEMENT OUT subcommand definition**

The ZAC MANAGEMENT OUT subcommand functionality and behavior is defined in ACS-4.

[Some ZAC MANAGEMENT OUT subcommands \(see ZAC-2\) are processed as ordered NCQ commands \(see 4.1.1.1024\).](#)

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