



Changes to FCP, Revision 4

- Reformatted to meet editorial requirements.
- Added Foreword and Introduction
- Removed reference to P1275 Open Boot Standard
- Examples moved to Annex A
- Technical Changes:
 - Link Management improved
 - Optional Data Transfer Ready provided
 - Combined Command/Data Sequence provided
 - FCP Entity Address, Data Descriptor, Status matched to FC-PH
 - Informative Annex for Entity Address included
 - Default Entity Address Defined



Link Management

■ Link Application Frames for FCP

■ FCP login

Command + Data Allowed bit
Transfer Ready Disabled bit

■ FCP logout

Terminates FCP login

■ FCP reject

Rejects Link Application Frame

■ FCP accept

Accepts Link Application Frame

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Sequence Formats

■ Optionally disable Data Transfer Ready

Controlled by FCP Login

Default value is Data Transfer Ready required

■ Combined Command/Data Sequence

Controlled by FCP Login

Default value is separated Command/Data Sequence

Combined Command/Data Sequence allowed only if Data Transfer Ready is disabled.

Data/Status Sequence cannot be combined.



Sequence Formats

■ FCP Sequences sent to Targets

SN	PHASE	DATA BLOCK		F/M/L	SI	SC	RO	M/O
		CAT	CONTENT					
T1	CMD	6	COMMAND	F	T	0	0	M
T2	CMD	6	COMMAND	F	H	0	0	O
T3	DATA	1	DATA	M	T	0	disp	M
T4	DATA	1	DATA	M	H	0	disp	O
T5	CMD/DATA	6/1	COMMAND + DATA	F	T	0	0	O
T6	CMD/DATA	6/1	COMMAND + DATA	F	H	0	0	O

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Sequence Formats

■ FCP Sequences sent to Initiators

SN	PHASE	DATA BLOCK		F/M/L	SI	SC	RO	M/O
		CAT	CONTENT					
I1	DATA	5	WRITE XFER RDY	M	T	0	0	M
I2	DATA	5	READ XFER RDY	M	H	0	0	M
I3	DATA	1	DATA	M	H	0	disp	M
I4	STATUS	7	STATUS	L	T	0	0	M



FCP Entity Address, Data Descriptor

■ Entity Address

At beginning of Command Sequences (Category 6)

Field	Size
ENT_ADDR_0	2 bytes
ENT_ADDR_1	2 bytes
ENT_ADDR_2	2 bytes
ENT_ADDR_3	2 bytes

■ Data Descriptor

At beginning of Read/Write Xfer Ready Sequences (Category 5)

Field	Size
SEQ_RO	4 bytes
BURST_LEN	4 bytes
Reserved	4 bytes



FCP Generic Status

■ Generic Status

Included in first four bytes of FCP Status Sequence (Category 7)

Field	Size
reserved	4 bytes
reserved	4 bytes
FCP_STATUS	4 bytes
FCP_RESID	4 bytes
FCP_SNS_LEN	4 bytes
FCP_RSP_LEN	4 bytes
FCP_SNS_INFO	n bytes
FCP_RSP_INFO	m bytes

Bytes are presently reserved = 0, pending future definition



Entity Address

- Annex B defined to describe Entity Address model
- Default Entity Address defined (7.1.1)

Address of '0000 0000 0000 0000' hexadecimal shall exist and accept INQUIRY command.

Type, Manufacturer, Model, Driver Requirements, and configuration mechanism can be determined from INQUIRY data.

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Discussion Items for FCP

- Relative Offset not available
- Data Descriptor boundary restrictions
- Class 1 Behavior
- ACK_N behavior
- Class 3 Behavior
- Reset and related behavior
- ACA behavior

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Discussion Item

Relative Offset not available

■ Limitations if RO not supported

Propose: In order delivery required within a sequence.

Data Transfer Ready establishes order among sequences, if enabled.

Data transferred in a single sequence if Transfer Ready not enabled either.

■ Data Base operations may require “in order” delivery

Propose: Use of FCP_CNTL bit = 1 to require “in order” delivery over entire data transfer, even if RO and Data Transfer Ready enabled.

Use bit 0 in Byte 2.

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Discussion Item

Data Descriptor boundary restrictions

■ Cache line boundaries easier to handle on Data Transfer

Present: No boundaries enforced between Data sequences. A Data sequence may be any length and end on any boundary.

Suggestion: Some have requested that Data sequence length be restricted to a multiple of 4, 16, or 64 bytes.

Propose: No change from present architecture.

Reason: Since there are no inherent limitations on where a sequence may begin putting data in memory, hardware should be capable of managing any boundary. If so, then it can manage any boundary for every sequence. Then sequence length does not matter.

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Discussion Item

Class 1 Behavior

■ Class 2 Behavior

Defined by normal FCP transactions

■ Class 1 Behavior

Propose: To maintain parallel operation among many I/O operations, connections will be made for the duration of one sequence. If multiple commands or status are available for the same destination, the connection may carry multiple sequences. Reverse sequences are optional.

■ Hybrid Behavior

Propose: For fabrics supporting mixed Class 1 and 2 operation, performance optimization may put Data sequences in Class 1 and the short sequences in Class 2. All have same exchange id.

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Discussion Item ACK N behavior

■ No problem for FCP

Present: No problem for FCP because sequences within an exchange are not streamed. If a sequence is not complete, the exchange stops and times out. Parallel exchanges continue normally and with no possibility of ambiguity.

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Discussion Item Class 3 Behavior

■ Class 3 Behavior

Propose: Class 3 should not be allowed.

FCP depends on verified receipt of sequences within an exchange to continue the processing through an exchange. Class 3 would require additional sequences to perform the same function, putting the ACK_N function into the ULP behavior and removing it from the hardware assisted behavior typical of Class 1 and Class 2. FCP would then have two independent protocols, one using a ULP ACK_N, the other using an FC-PH ACK_N.

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Discussion Item

Reset and related behavior

■ Under Study

■ Straw Man

SCSI

RST

Bus Device Reset

Abort, Abort Tag

Clear Queue

Terminate I/O

FCP

Logout/Login

FCP_CNTL Reset (byte 2, bit 5)

Abort Exchange

n x Abort Exchange

NA



ACA Behavior

- Under Study
- Straw Man

Propose:

Request Sense Data returned as part of Response sequence

Normal/default operation ends ACA automatically at end of command.

Extended Contingent Allegiance mode of ACA may be invoked by FCP_LOGI option. If invoked, extended ACA begins automatically at end of command presenting Check Condition and Request Sense Data. All other commands to the Entity remain suspended. All commands with Queue Type ACA_Q from the same source and image are accepted by the Entity. The extended ACA is cleared at the end of the first Queue Type ACA_Q command with the Clear ACA bit set in byte 2 of FCP_CNTL.

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