

Document: T10/02-318r0
To: T10 Committee Membership
From: Edward A. Gardner, Basil Networks
Subject: SAS Data Transfer Rules

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SAS-r01 places very few constraints on how data transfers are performed. For example, SAS-r01 allows a data transfer to be performed as a series of DATA IUs containing only a single byte of data, or any other arbitrary combination of data lengths. This flexibility is of negligible utility to ports that send DATA IUs and complicates the design of ports that receive DATA IUs.

The intent of this proposal is to require that all DATA IUs for a command be the maximum length (1024 bytes), except the final DATA IU for a command (in either direction) may be any length.

Clause 9.2.1, page 171, paragraph beginning "The NUMBER OF FILL BYTES field...". Add the sentence:

The NUMBER OF FILL BYTES field shall contain zero and fill bytes shall not be present in all IUs except the last DATA frame transmitted by either initiator or target for a command.

Alternately this rule could be specified separately for each frame type in clauses 9.2.2.x or 9.2.3.x.

Clause 9.2.3.4, DATA information unit. Add the following:

The last DATA IU transmitted by either initiator or target for a command shall contain between 1 and 1024 bytes in the DATA field. All other DATA IUs shall contain 1024 bytes in the DATA field.

Clause 9.2.3.3, XFER_RDY information unit. Add the following:

The WRITE DATA LENGTH field in the last XFER_RDY IU sent by the target for a command shall contain a non-zero value. The WRITE DATA LENGTH field in all other XFER_RDY IUs sent by the target for a command shall contain a non-zero value that is divisible by 1024.

The following nits were encountered while preparing this proposal. It seems better to mention them now rather than waiting until letter ballot review. I will remove any that anyone objects to, as they are irrelevant to the substance of this proposal.

Some portions of the text (e.g. clause 9.2.1) refer to COMMAND frames, DATA frames, etc. Other portions (e.g. clause 9.2.2) refer to COMMAND IUs, DATA IUs, etc. A few places refer to COMMAND information units, etc. These should be made consistent.

Clause 9.2.1, page 171, paragraph beginning "The NUMBER OF FILL BYTES field...". Start a new paragraph with the sentence beginning "The initiator port shall set the COMMAND ID field...".

Clause 9.2.1, top of page 172, specifies that the CRC is checked by the link layer, not the transport layer. That implies that the CRC is part of the link layer frame format and should not be discussed in clause 9 or shown in table 60.

The rules for each type of frame or information unit are spread between clauses 9.2.2.x and 9.2.3.x. These would be better combined so that all rules appeared in one place.

Proposal 02-169r2 was incorrectly incorporated into clause 9.2.2.3. The present wording allows more than one XFER_RDY to be simultaneously outstanding. E.g. the present wording allows the target to send two XFER_RDY IUs for the same command back-to-back, provided it sends the second before receiving any DATA IUs.

Clauses 9.2.2.x discuss when various frames may be sent for an I_T_L_Q nexus. This usage is incorrect. For example, DATA IUs for a command must be sent before the command's RESPONSE IU. However the I_T_L_Q nexus may persist past the RESPONSE IU with linked commands.