

Accredited Standards Committee
X3, Information Processing Systems

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Reply to: John Scheible

To: X3T10.1 Membership
From: John Scheible

Subject: SSA-S3P Services Model

BACKGROUND

At the May 1st, 1996 plenary meeting, the X3T10.1 group decided to move alternate path control into the protocol layer (from the transport layer) and the tag value control from the protocol layer into the transport layer.

As a first pass, I included the model section described on the following page into SSA-S3P rev 1. Revision 1 of this proposal updates Annexes C and D (protocol and transport services models). Revision 2 was approved in the June 1996 X3T10.1 plenary for inclusion in SSA-S3P rev 2.

PROPOSAL

- 1) Move the conventions clause under Definitions, symbols and abbreviations.
- 2) Add a new section described on the following page under the General clause.
- 3) 3.1.11 - Replace the full duplex definition of Logical path with the following:
Logical Path: logical path: A **unidirectional** conduit for the ordered delivery of SMS and data frames between an initiator-target pair.
- 4) Remove the warning note at the beginning of Annex C.
- 5) Remove C.1.4 as it is handled under deadlock (C.1.5)
- 6) Add a new bullet to C.1.6 (implementation) with
If a single initiator node uses two different protocols, then Tag assignment must be at the transport layer to avoid confusion in the data transfer SMSs. This involves the use of the GET TAG and FREE TAG transport services at the beginning and end respectively of the SCSI Command protocol services (see Table C.3). The Outstanding Commands Table entry (see Table C.1) also needs an AC TAG field to respond to the application client with the proper Tag value (AC TAG) while the transport layer uses the same Tag as defined by the GET TAG transport service. The same requirements exist for the Task Management functions (see Table C.7) and Outstanding Tasks table entry (see Table C.2).
- 7) Add a new Table C.7 as shown on the following page.
- 8) Remove the warning note at the beginning of Annex D.
- 9) Replace D.2.1 (GET RETURN PATH ID) with GET LOGICAL PATH as shown on the following page. Replace the references throughout the document.
- 10) Add two new services after D.2.1, GET TAG and FREE TAG as shown on the following page. Update Table C.3

X.2 Model

X.2.1 SAM Services

The SSA-S3P protocol layer maps the SAM Services model with some additional enhancements onto the SSA-TL2 transport layer services (see Annex C).

X.2.2 Logical paths

The SSA-S3P protocol layer provides a logical path between the Application Client and the node identified by a Unique ID. This logical path guarantees ordered delivery of tasks. A feature in addition to the SAM Services is the ability of the Application Client to request multiple logical paths and control what tasks use which logical path. If the task uses the Confirmed Status feature, the SSA-S3P layer will automatically redirect all outstanding tasks to use an alternate path (if any exist) in the event of a path failure.

X.2.3 Path control

The SSA-S3P protocol layer controls the use of paths to guarantee a logical path when needed.

X.2.3.1 Use of multiple outgoing logical paths

If an initiator uses multiple outgoing logical paths, then ordering across logical paths is not guaranteed (although ordering is guaranteed within a logical path).

X.2.3.2 Use of multiple return logical paths

If an initiator uses multiple return logical paths, then receipt of SCSI STATUS SMSs received may not indicate the order the commands were executed within the target (although ordering is guaranteed within a logical path).

X.2.4 Tag control

The SSA-TL2 transport layer controls the allocation of TAG field values. This is required to meet the requirement that TAG field values be unique across all outstanding tasks that use data transfer SMSs for all simultaneous protocol layers being used by the I_T nexus.

X.2.5 Data Channels

The SSA-TL2 transport layer controls the allocation of data channel for data transfer.

X.2.6 Outstanding Commands table and Outstanding Tasks table

The SSA-S3P protocol layer maintains a list of outstanding commands and tasks for the following reasons:

- a) map the appropriate completion SMSs to the task;
- b) transparently handle link failure by redirecting tasks;
- c) provide an interlock for TASK SET FULL, BUSY and ACA ACTIVE;
- d) and provide a means to emulate Contingent Allegiance.

Table C.7 - Task management execution services activity

SAM	Protocol	Transport	Cable	Transport	Protocol	SAM
Protocol Services		Transport Services		Transport Services		Protocol Services
==>Send Task Management Request		==>GET LOGICAL PATH ==>SEND SMS		==>Task Management SMS		==> SMS RECEIVED <== GET UNIQUE ID
						==> Task Management Request Received
						Task executed
<== Command Complete Received		<==SMS RECEIVED		<==SCSI RESPONSE SMS		<==SEND SMS <== Task Management Function Executed

D.2.1 GET LOGICAL PATH

GET LOGICAL PATH (Destination ID, Logical Path Number || Return Path ID, Return Code)

The GET LOGICAL PATH initiator transport service request is used during the construction of a protocol layer SMS to assign a Return Path ID for a given Logical Path Number. The input parameters are the Destination ID and Logical Path Number. The Output parameters are Return Path ID and Return Code.

The Destination ID parameter is the identifier for the Destination node.

The Logical Path Number is a number for a logical path. The same Return Path ID will always be returned for a given Logical Path Number.

The Return Path ID parameter is the Return Path ID to be used for that Logical Path. The same Return Path ID may be used for multiple Logical Path Numbers, but a given Logical Path Number will always return the same Return Path ID.

The Return Code parameter indicates the status of the GET LOGICAL PATH service request. A value of INVALID PARAMETER indicates that the Destination ID is not known.

D.2.2 GET TAG

GET TAG (Destination ID || Tag, Return Code)

The GET TAG initiator transport service request is used during the construction of a protocol layer SMS to assign a Tag value. The input parameter is the Destination ID. The Output parameters are Tag and Return Code. This service request does not need to exist and Tag assignment can be controlled within the protocol layer if only one protocol layer is running in the initiator at a time. The GET TAG service request needs to be implemented only in initiators that have multiple protocols running at any given time.

The Destination ID parameter is the identifier for the Destination node.

The Tag parameter is the value to be used for the TAG field, and is unique for all outstanding Tag values to that node. The Tag value is freed with a FREE TAG transport layer service request, and is only valid if the Return Code parameter indicates FUNCTION SUCCESSFUL.

The Return Code parameter indicates the status of the GET TAG service request. A value of FUNCTION FAILED indicates that no unique Tag value is available at this time.

D.2.3 FREE TAG

FREE TAG (Destination ID, Tag || Return Code)

The FREE TAG initiator transport service request is used during the construction of a protocol layer SMS to free a Tag value. The input parameters are the Destination ID and Tag. The Output parameter is Return Code. This service request does not need to exist and Tag assignment can be controlled within the protocol layer if only one protocol layer is running in the initiator at a time. The FREE TAG service request needs to be implemented only in initiators that have multiple protocols running at any given time.

The Destination ID parameter is the identifier for the Destination node.

The Tag parameter is the value to be freed. The Tag value can be considered freed if the Return Code parameter indicates FUNCTION SUCCESSFUL.

The Return Code parameter indicates the status of the FREE TAG service request. A value of INVALID PARAMETER indicates that the Destination ID is not known, or the Tag value was not assigned.

Sincerely,

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