To: INCITS T10 Committee

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Subject: Frame Number restrictions for link frames in ADT.

1 Revision History

Revision 0:
Posted to the T10 web site 14 November 2003.

Revision 1:
Posted to the T10 web site 2 January 2004. Modified per suggestions made at the ADI Working Group conference call on 15 December 2003.

2 General

At the meeting of the ADI working group in Austin on 3 November 2003 a modification of the frames number to be used for certain link service frames was discussed. See 03-378 for item 6a for further details. This proposal addresses this discussion by suggesting changes to ADT in the following manner:
1. Specify the FRAME NUMBER field in frames for Port Login, Port Logout, Pause, and NOP IUs bet set to zero.
2. Specify the Next Frame Number to Send and Expected Frame Number counters roll from 7 to 1 instead of from 7 to 0.
3. Change the MAXIMUM ACK OFFSET field in the Port Login IU from 3 bits to 2 so that the value in can contain can never be larger than 3.

3 Proposal

3.1   Modifications to subclause 4.6.2

In subclause 4.6.2, modify the subclause as follows:

The Next Frame To Send counter value shall be calculated as follows:
1. It shall be set to one after sending or receiving a Port Login IU with the AOE bit set to one and the ACCEPT bit set to zero;
2. it shall be set to one after sending or receiving a Port Logout IU;
3. it shall be set to one after sending a Port Login IU with the ACCEPT bit set to one;
4. it shall be set to the value in the FRAME NUMBER of an Initiate Recovery IU that is sent by the port;
5. it shall not be adjusted after sending an acknowledgement IU, a Port Login IU with the AOE bit set to zero, a Pause IU, or a NOP IU; and
6. after sending all other frame type, it shall be set frame number of the last frame sent plus one. If this value is greater than seven, it shall be set to one.

3.2   Modifications to subclause 4.6.3

In subclause 4.6.3, modify the list describing the Expected Frame Number counter as follows:

1. It shall be set to one after sending or receiving a Port Login IU with the AOE bit set to one or a Port Logout IU;
2. it shall not be adjusted when receiving an acknowledgement IU, a Port Login IU with the AOE bit set to zero, a Pause IU, a NOP IU, or a frame with a receiver detected error (see 4.7.1.3);
3. it shall be set using the rules in clause 4.7 when an Initiate Recovery IU is received or when the port is operating in P3:Recovering state; and
4. if the port is operating in P2:Active state, the port shall compare the FRAME NUMBER field in each received frame with the Expected Frame Number counter, and:
   a) If they do not match, the port shall send a NAK IU in response to the frame with a status code of UNEXPECTED FRAME NUMBER and the Expected Frame Number counter shall not be adjusted; or
   b) If they do match, the Expected Frame Number counter shall incremented by one. If this value is greater than seven, it shall be set to one.

Add the following paragraph following the list:

A port that receives a Port Login IU, Port Logout IU, Pause IU, or NOP IU shall verify the frame number field in the frame header is set to zero. If the frame number field is not zero, the port shall respond with a NAK IU with a status code of ILLEGAL OR INVALID IU RECEIVED (new status defined by 03-355). The IU shall not be processed any further by the port.

3.3   Modifications to subclause 6.3

Modify the paragraph that describes the frame number field as follows:

The FRAME NUMBER field is assigned by the transmitting port to uniquely identify a frame from other frames sent by that port over a small period of time. It ranges from zero to seven. ACK IUs return the FRAME NUMBER field value of the frame that they are acknowledging. The FRAME NUMBER field of a NAK IU shall contain the Expected Frame Number counter (see 4.6.3). THE FRAME NUMBER field of a Port Login IU, Port Logout IU, Pause IU, or NOP IU shall be set to zero. A transmitting port shall assign all other types of frames the value in the Next Frame to Send counter, independent of the traffic the port is receiving (see 4.6.2).

3.4   Modifications in subclause 6.5.4

Modify Table 16 do that the MAXIMUM ACK OFFSET field includes bits 0 and 1 and the Reserved field extends from bits 2 through 6 in byte 3.