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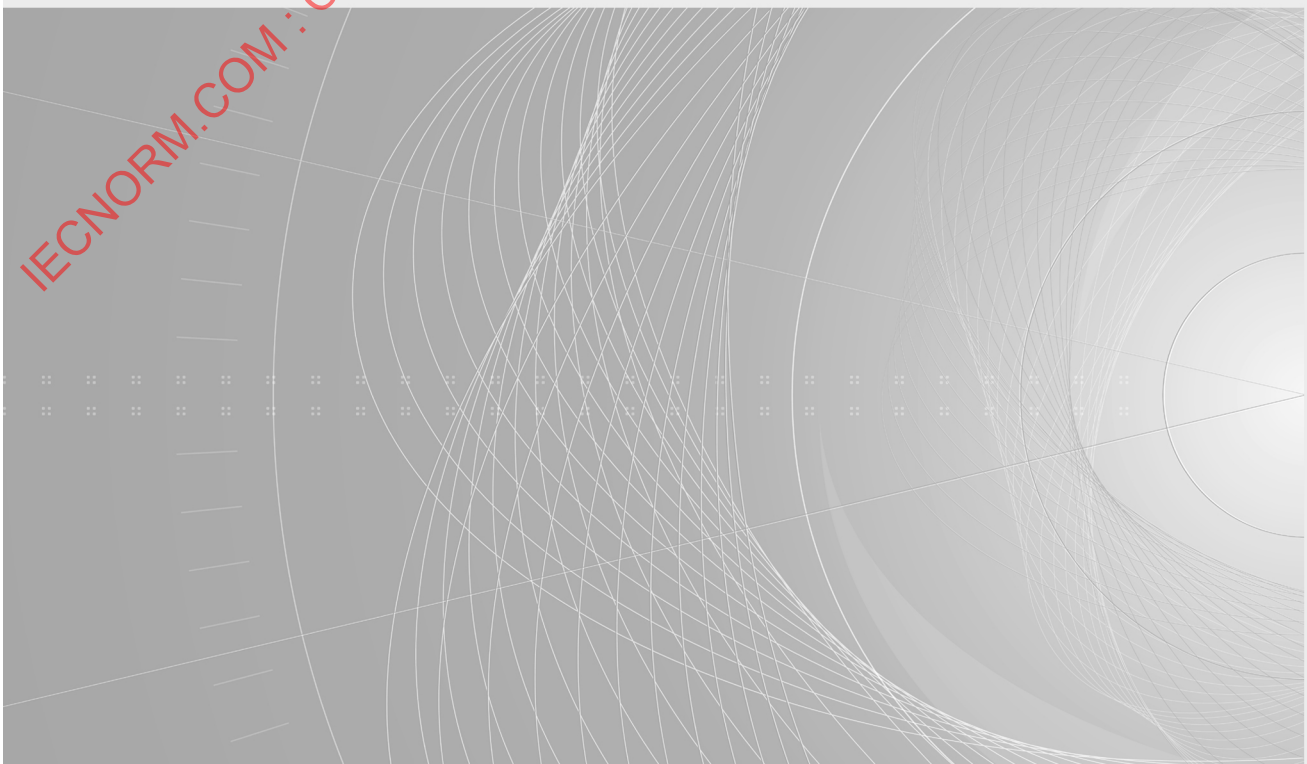
INTERNATIONAL STANDARD

AMENDMENT 1

Information technology – Fibre channel – Part 122: Arbitrated loop-2 (FC-AL-2)



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FOREWORD

Amendment 1 to International Standard ISO/IEC 14165-122 was prepared by subcommittee 25: Interconnection of information technology equipment, of ISO/IEC joint technical committee 1: Information technology.

This International Standard has been approved by vote of the member bodies, and the voting results may be obtained from the address given on the second title page.

This publication has been drafted in accordance with the ISO/IEC Directives, Part 2.

INTRODUCTION to Amendment 1

Since the publication of ISO/IEC 14165-122:2005 (FC-AL) important technical corrections have been developed.

FC-AL-2 defines a method for the operation of a FC arbitrated loop. This amendment revises the base document, FC-AL-2, with respect to some inconsistencies found since approval of the base document.

This amendment contains the following changes:

- the transmission word delay through an L_Port is changed from 6 words to 12 words to accommodate higher fibre channel speeds; for example, 8 Gbit/s and 16 Gbit/s.
- the OPEN state is corrected to assure fairness for an L_Port that is using the TRANSFER state while another L_Port is using ARBf.

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8.0 Overview

Replace the existing text of the second pagagraph (below the three dashed items) by the following:

The maximum delay of a Transmission Word through an L_Port in the MONITORING or ARBITRATING state should not exceed twelve (12) Transmission Word periods. See 8.2.2 for maximum round trip latency and Annex A for L_Port Elasticity buffer management.

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8.2.3 Loop timeout

Replace the existing text of this subclause by the following new text:

The Loop timeout value (LP_TOV) is 2 s. LP_TOV is used to keep a Loop from deteriorating due to protocol errors or lost Ordered Sets. For example, LP_TOV is used to reset the fairness window (see 4.3) and during the INITIALIZATION process to time start-up events (see 10.5.4).

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13 State 0 (MONITORING) actions

Replace the third paragraph including its dashed items by the following new paragraph:

If Idle is received, the CFW shall be modified as follows:

— if REPEAT is FALSE(0) and:
  – if ARBf_SENT is FALSE(0), the CFW shall be set to Idle and ACCESS shall be set to TRUE(1) or
  – if ARBf_SENT is TRUE(1), the CFW shall be set to ARB(FF) and ACCESS shall be set to TRUE(1).
— if REPEAT is TRUE(1), the CFW shall be set to Idle.

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16 State 3 (OPEN) actions

Replace the existing text beginning with the NOTE below the first paragraph to, and including, the NOTE following the 10th paragraph by the following:

NOTE 1 The six (6) Ordered Sets maintain the FC-FS spacing before SOF; R_RDYs allow the OPENED L_Port to transmit frame(s) without using BB_Credit. One R_RDY does not take any extra bandwidth.

The L_Port shall process, and shall not retransmit subsequent Transmission Words received on its inbound fibre. The L_Port shall transmit Primitive Signals, Primitive Sequences, or frames as specified in FC-PH (see 8.3.4).

If Idle is received, the CFW shall be set to Idle and ACCESS shall be set to TRUE(1).

If ARB(F0) is received, the CFW shall be set to Idle and XMIT_2_IDLES shall be set to TRUE(1).

NOTE 2 Receiving ARB(F0) indicates that no other L_Port is now arbitrating (i.e., no L_Port changed ARB(F0) to ARB(val)).

If ARB(FF) is received, the CFW shall be set to ARB(FF) and ACCESS shall be set to TRUE(1).

If a Fill Word is to be transmitted, the CFW shall be used.

NOTE 3 Since ARB_WON is TRUE(1) in this state, XMIT_2_IDLES will not be set to FALSE(0).

If CLS is received, the LPSM shall make the transition to the RECEIVED CLOSE state (see item 9 and item 19).

If MRKtx is received, where the MK_TP and AL_PS match the expected values, the action identified by MK_TP shall be performed. The received MRKtx shall not be retransmitted.

If REPLICATE is TRUE(1) and the L_Port requests a broadcast replicate (REQ(open fr) or another selective replicate REQ(open yr)), the LPSM shall transmit OPN(fr) or one OPN(yr) for each request at the next appropriate Fill Word, respectively.

If ACCESS is TRUE(1) and the L_Port requests a transfer (REQ(transfer)), the LPSM shall transmit CLS instead of the appropriate Fill Word and then shall make the transition to the TRANSFER state (see item 10 and item 20). If ACCESS is FALSE(0), the request to transfer is treated as a request to close. If a Class 1 connection exists, the L_Port shall remove the Class 1 connection before transmitting CLS; only the L_Port which received EOFdt shall transmit the first CLS.

The LPSM may begin to close the Loop (REQ(close)) or REQ(send DHD) by transmitting CLS or DHD instead of the next appropriate Fill Word. If CLS is transmitted, the LPSM shall make the transition to the XMITTED CLOSE state or the TRANSFER state. If DHD is transmitted, the LPSM shall remain in the OPEN state, shall set DUPLEX to FALSE(0) and shall not transmit Data frames. If a Class 1 connection exists, the L_Port shall remove the Class 1 connection before transmitting CLS; only the L_Port which received EOFdt shall transmit CLS (see item 8 and item 18 or item 20).

NOTE 4 Reasons for transmitting CLS or DHD include, but are not limited to:

– ARB(val) was detected to indicate that another L_Port is arbitrating (the OPEN L_Port may close the Loop at a convenient time);
– frame transmission is required with a different L_Port;
– the L_Port has not received any credit to transmit frames before a timeout occurred (an appropriate value would be AL_TIME since this L_Port is the originator of the Loop circuit);
– there are no additional frames to transmit to the other L_Port; or,
– the L_Port is making the transition to the Non-Participating mode.

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Table 4 – MONITORING (State 0) transitions

Replace the first four sections of this table (the entire table on page 61) by the following new table:

	ENTRY ACTIONS	
ACCESS := N/C		DHD_RCV := N/C
ARB_PEND := 0	DUPLEX := 0	BYPASS := N/C
ARB_WON := 0	REPLICATE := 0	XMIT_2_IDLES := N/C
ARBf_SENT := 0	CFW := N/C	
INPUT	**ACTION / OUTPUT**	**NEXT STATE**
LOSS of SYNC. < R_T_TOV	Idle or CFW [12]	MONITORING
Loop Failure REPEAT = 0 REPEAT = 1	 None/Inst. LIP(F8)	 LOOP-FAIL-INITIALIZE MONITORING
INVALID TRANS. WORD	CFW	MONITORING
RUNNING DISP at O.S.	CFW	MONITORING
ELASTICITY WORD REQd	CFW	MONITORING
VALID DATA WORD FL_Port NL_Port REPLICATE = 0 REPLICATE = 1	 Same Word Same Word Rceive Word Same Word	 MONITORING MONITORING MONITORING
VALID TRANS. WORD =O.S.		
FRAME DELIMITERS		
FL_Port NL_Port SOFxx REPLICATE = 0 REPLICATE = 1 EOFxx REPLICATE = 0 REPLICATE = 1	Same Word Same Word Receive Word Same Word Same Word Receive Word Same Word	MONITORING MONITORING MONITORING MONITORING MONITORING
PRIMITIVE SIGNALS		
Idle REPEAT = 0 ARBf_SENT = 0 ARBf_SENT = 1 REPEAT = 1	 CFW := Idle ACCESS := 1 CFW CFW := ARB(FF) ACCESS:=1 CFW CFW := Idle CFW	 MONITORING MONITORING MONITORING
R_RDY	Same Word	MONITORING
ARByx y <> x	CFW[13]	MONITORING

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Table 7 – OPEN (State 3) transitions

Insert, in the section "PRIMITIVE SIGNALS," a new row between the rows "ARB(F0) and "ARByx", as follows:

ARB(FF)	CFW := ARB(FF) ACCESS := 1 FC-2 FP/PSig/PSeq	OPEN