

# ISO/IEC TR 14165-312:2009-07 (E)

Information technology – Fibre channel – Part 312:  
Avionics environment upper layer protocol (FC-AE 1553)

---

## CONTENTS

FOREWORD.....	5
INTRODUCTION.....	7
1 Scope.....	8
2 Normative references .....	8
3 Terms, definitions and conventions.....	8
3.1 General considerations.....	8
3.2 Terms and definitions .....	9
3.3 Conventions .....	10
3.3.1 General .....	10
3.3.2 Binary notation .....	11
3.3.3 Hexadecimal notation .....	11
3.3.4 Abbreviations and acronyms.....	11
3.4 Applicability and use of this document.....	11
4 FC-AE-1553 profile.....	12
4.1 General .....	12
4.2 FC-AE-1553 elements .....	12
4.3 Mapping legacy 1553 applications to FC-AE-1553.....	13
4.3.1 General .....	13
4.3.2 NT address.....	14
4.3.3 NT subaddress .....	14
4.3.4 Byte Count/Mode code .....	15
4.4 FC-AE-1553 ULP features .....	15
4.4.1 Information units.....	15
4.4.2 Exchange formats.....	20
4.4.3 FC-AE-1553 ULP profile .....	40
4.4.4 MIL-STD-1553 ULP mapping to FC-AE-1553 .....	44
Annex A (normative) FC-AE-1553 process login .....	72
A.1 Overview of process login and process logout .....	72
A.2 PRLI.....	73
A.2.1 Use of PRLI by FC-AE-1553.....	73
A.2.2 Process_Associator requirements .....	73
A.2.3 New or repeated process login .....	73
A.2.4 PRLI payload page length and payload length fields.....	73
A.2.5 PRLI request FC-AE-1553 service parameter page format.....	74
A.2.6 Operation of PRLI service parameters which are common to NC and NT.....	78
A.3 A.3 PRLO .....	79
Annex B (informative) FC-AE-1553 Fibre Channel profile.....	80
B.1 General .....	80
B.2 FC-FS-2 and FC-AL-2 features for FC-AE-1553.....	80
B.3 Point-to-point and link protocols .....	83
B.4 Arbitrated loop-specific features .....	83
B.5 Fabric login .....	84
B.5.1 Introduction .....	84

B.5.2 Fabric login – Common service parameters .....	84
B.5.3 Fabric login – Class specific service parameters .....	85
B.6 Port login.....	85
B.6.1 General .....	85
B.6.2 Classes of service supported.....	85
B.6.3 N_Port Login – Common service parameters.....	85
B.6.4 N_Port login – Class 3 service parameters .....	86
B.7 Basic link services .....	86
B.8 Broadcast and multicast support.....	86
B.9 FC-FS header fields .....	86
B.9.1 R_CTL field .....	86
B.9.2 TYPE field .....	86
B.9.3 Optional headers .....	86
B.9.4 Frame control (F_CTL) .....	86
B.9.5 Sequence identifier (SEQ_ID).....	87
B.9.6 Data field control (DF_CTL).....	87
B.9.7 Sequence count (SEQ_CNT).....	87
B.9.8 Originator exchange identifier (OX_ID).....	87
B.9.9 Responder exchange identifier (RX_ID).....	87
B.10 Extended link services.....	87
B.11 Well known address support.....	88
Annex C (informative) Bridging from FC-AE-1553 networks to MIL-STD-1553 buses.....	89
Bibliography.....	91

Figure 1 – Network Controller To Network Terminal transfers: NT Burst Size Request = '0'b, Delayed NT Burst Size Request = '0'b.....	21
Figure 2 – Network Controller To Network Terminal Transfers: NT Burst Size Request = '1'b, Delayed NT Burst Size Request = '0'b.....	22
Figure 3 – Network Controller to Network Terminal transfers: NT Burst Size Request = '0'b, Delayed NT Burst Size Request = '1'b.....	23
Figure 4 – Network Terminal-to-Network Controller.....	25
Figure 5 – NT-to-NT Transfers: NT Burst Size Request = '0'b, Delayed <i>NT Burst Size Request</i> = '0'b .....	26
Figure 6 – NT-to-NT transfers: NT Burst Size Request = '1'b, Delayed NT Burst Size Request = '0'b .....	28
Figure 7 – NT-to-NT Transfers: Originating NC is also receiving NT, with NT Burst Size Request = '1'b, Delayed NT Burst Size Request = '0'b .....	29
Figure 8 – NT-to-NT transfers: Delayed NT Burst Size Request = '1'b, NT Burst Size Request = '0'b .....	31
Figure 9 – NT-to-NT transfers: originating NC is also receiving NT, with delayed NT Burst Size Request = '1'b, NT Burst Size Request = '0'b.....	33
Figure 10 – Mode command without Data Word .....	35
Figure 11 – Transmit Mode Command with Data Word.....	35
Figure 12 – Receive Mode command with Data Word .....	36
Figure 13 – NC-to-NTs transfers (broadcast or multicast) .....	36
Figure 14 – Network Terminal to Multiple Network Terminals .....	38
Figure 15 – Transmit mode command without Data Word to Multiple Network Terminals.....	39

Figure 16 – Receive mode command with Data Word to Multiple Network Terminals .....	40
Figure 17 – FC-AE-1553 ULP timers: (a) NT_C/S_TOV and NT_C-D/S_BURST_TOV; (b) NC_C/S_TOV and NC_C-D/S_BURST_TOV; (c) C-S/D_TX_TOV (shown for NC and NT); (d) C-S/D_RX_TOV (shown for NC and NT) .....	62
 Figure C.1 – FC-AE-1553 network to MIL-STD-1553 bus bridge.....	89
 Table 1 – Summary and use of features.....	12
Table 2 – Terminology equivalents between MIL-STD-1553 and FC-AE-1553 .....	13
Table 3 – Comparison of MIL-STD-1553 and FC-AE-1553 Command Field Sizes.....	14
Table 4 – Information units transmitted by the Network Controller to Network Terminal, and transmissions by the transmitting NT for NT-to-NT or NT-to-NTs transfers .....	16
Table 5 – Information Units Initiated from the Network Terminal, Excluding Transmissions by the Transmitting NT for NT-to-NT or NT-to-NTs Transfers.....	19
Table 6 – FC-4 profile for FC-AE-1553.....	41
Table 7 – FC-AE-1553 command sequence header .....	46
Table 8 – Multicast address or other Port_ID Field.....	52
Table 9 – FC-AE-1553 status sequence header .....	57
Table 10 – Correct values for F_CTL field bits .....	64
Table 11 – Values for D_ID field (for broadcast); NT-to-NT Transfer, T/R*, Tx RDMA, and RDMA bits; subaddress, byte Count/Mode code, and other subaddress fields.....	65
Table 12 – Correct values for fourth word of FC-AE-1553 header extension.....	69
Table 13 – Correct Values for multicast address or other Port_ID field.....	69
 Table A.1 – FC-AE-1553 PRLI service parameter page, PRLI request and accept .....	74
Table A.2 – FC-AE-1553 PRLI service parameters – corresponding words/bits for PRLI parameters which are common to NC and NT operation.....	79
 Table B.1 – FC-FS and FC-AL-2 Features for FC-AE-1553 .....	80
 Table C.1 – Use of FC-AE-1553 subaddress and/or other subaddress field for command sequences involving bridging to MIL-STD-1553 RTs .....	89