

TECHNICAL REPORT

Information technology — **ITd STANDARD PREVIEW**
Part 372: Fibre channel methodologies for interconnects-2 (FC-MI-2)
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INFORMATION TECHNOLOGY – FIBRE CHANNEL –

Part 372: Fibre channel methodologies for interconnects-2 (FC-MI-2)

FOREWORD

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ISO/IEC 14165-372, which is a technical report, has been prepared by subcommittee 25: Interconnection of information technology equipment, of ISO/IEC joint technical committee 1: Information technology.

The list of all currently available parts of the ISO/IEC 14165 series, under the general title *Information technology – Fibre Channel*, can be found on the IEC web site.

This Technical Report 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.

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INTRODUCTION

This technical report specifies common methodologies for both Arbitrated Loop and Switched environments. The goal of this technical report is to facilitate interoperability between devices whether they are connected in a loop or Fabric topology.

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INFORMATION TECHNOLOGY – FIBRE CHANNEL –

Part 372: Fibre channel methodologies for interconnects-2 (FC-MI-2)

1 Scope

This part of ISO/IEC 14165 is intended to document interoperability behavior for Fabric elements (i.e., E_Port, F_Port, FL_Port). This Technical Report includes a wide range of issues such as link initialization, error detection, error recovery, Fabric operation, management capabilities, and zoning.

This Technical Report serves as an implementation guide, whose primary objective is to maximize the likelihood of interoperability between conforming implementations. This Technical Report prohibits or requires some features that are in the referenced documents.

A second objective of this Technical Report is to simplify implementations and their associated documentation, testing, and support requirements. As a result there may be some optional features of the referenced documents that are not mutually exclusive, but are prohibited or required for the purpose of this simplification. Features that some but not all of the referenced documents require for compliance may be optional in this report. Each specification of such an optional feature in this report identifies the referenced document for which the feature is required.

Internal characteristics of conformant implementations are not defined by this Technical Report, but it incorporates features from the documents cited in clause 2.

2 Normative references

The following referenced documents are indispensable for the application of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the of the referenced document (including any amendments) applies.

The provision of the referenced specification other than ISO/IEC, IEC, ISO and ITU documents, as identified in this clause, are valid within the context of this Technical Report. The reference of such a specification within this Technical Report does not give it any further status within ISO/IEC. In particular, it does not give the referenced specification the status of an International Standard.

ISO/IEC 14165-115, *Information technology – Fibre channel – Part 115: Physical Interfaces (FC-PI)* ²

ISO/IEC 14165-122, *Information technology – Fibre Channel – Part 122: Arbitrated loop-2 (FC-AL-2)* ³

ISO/IEC 14165-133, *Information technology – Fibre channel – Part 133: Fibre Channel Switch Fabric-3 (FC-SW-3)* ⁴

T11/Project 1620D, *Fibre Channel - Link Services (FC-LS)* ⁵

INCITS TR-36-2003, *Fibre Channel - Device Attach (FC-DA)* ⁶

-
2. ANSI INCITS 352-2002, *Fibre Channel - Physical Interfaces (FC-PI)*
 3. ANSI INCITS 332-1999, *Fibre Channel - Arbitrated Loop (FC-AL-2)*
 4. ANSI INCITS 384-2004, *Fibre Channel - Switch Fabric - 3 (FC-SW-3)*
 5. ISO/IEC 14165-261, *Information technology – Fibre Channel – Part 261: Link services (FC-LS)* (under consideration)
 6. ISO/IEC 14165-341, *Information technology – Fibre Channel – Part 341: Device attach (FC-DA)* (under consideration)

ISO/IEC 14165-414, Information technology – Fibre Channel – Part 414: Generic services-4 (FC-GS-4) ⁷

ISO/IEC 14165-431, *Information technology – Fibre Channel – Part 431: Security Protocols (FC-SP)* (to be published) ⁸

Internet Engineering Task Force RFC 791, Internet Protocol, September 1981

Internet Engineering Task Force RFC 2373, IP Version 6 Addressing Architecture, July 1998

Internet Engineering Task Force RFC 2460, Internet Protocol, Version 6 (IPv6) Specification, December 1998

Internet Engineering Task Force RFC 3410, Introduction and Applicability Statements for Internet Standard Management Framework, December 2002

Internet Engineering Task Force RFC 4044, Fibre Channel Management MIB, May 2005

3 Terms, definitions, abbreviations and other conventions

3.1 Overview

For the purpose of this document the following definitions, conventions, abbreviations, acronyms, and symbols apply.

3.2 Terms and definitions

3.2.1

address identifier

address value used to identify source (S_ID) or destination (D_ID) of a frame

3.2.2

AL_PA bit map

bit map that shows which ports are present on an Arbitrated Loop

NOTE See FC-AL-2.

3.2.3

AL_PA position map

map that shows port ordering on an Arbitrated Loop

NOTE See FC-AL-2.

3.2.4

Arbitrated Loop time out value

AL_Time

time interval defined by FC-AL-2

3.2.5

Application

entity that makes requests of a Service

3.2.6

Arbitrated Loop Physical Address

AL_PA

one-byte address value

NOTE See FC-AL-2.

7. ANSI INCITS 387-2004, *Fibre Channel - Generic Services - 4 (FC-GS-4)*

8. T11/Project 1570D, *Fibre Channel - Security Protocols (FC-SP)*

3.2.7

AR0

special AR (see 3.2.9) containing only the switch backbone network, that in general may consist of point-to-point links, broadcast links, and switching devices

NOTE See FC-AL-2.

3.2.8

Area Identifier

second or middle level of the three-level addressing hierarchy, found in bits 15 through 8 of an address identifier

NOTE (see 3.2.1) and FC-SW-3.

3.2.9

Autonomous Region

AR

one or more Fibre Channel address domains consisting of switches that all run a common routing protocol

NOTE See FC-SW-3.

3.2.10

B_Port

Interconnect_Port used to connect bridge devices with E_Ports on a switch

NOTE See FC-SW-3.

3.2.11

Domain Identifier

highest level of the three-level addressing hierarchy, found in bits 23 through 16 of an address identifier (see 3.2.1)

NOTE See FC-SW-3.

3.2.12

E_Port

Fabric Expansion port that attaches to another Interconnect_Port to create an Inter-Switch Link

NOTE See FC-SW-3.

3.2.13

Entry Switch

role that a switch assumes with respect to a distributed service request

NOTE The switch that is attached to an Nx_Port making a service request assumes the role of an entry switch with respect to that request. See FC-SW-3.

3.2.14

Error_Detect_Timeout value

E_D_TOV

time interval defined in FC-FS-2

3.2.15

F_Port

port through which non-loop N_Ports are attached to a Fabric, and it does not include FL_Ports

3.2.16

Fabric

Fibre Channel frame transport infrastructure that includes switches and interconnects various Nx_Ports attached to it

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3.2.17**Fabric F_Port**

entity at the well-known address FFFFFFFh

NOTE See FC-SW-3.

3.2.18**Fabric_Name**

identifier associated with a Fibre Channel Fabric

NOTE See FC-FS-2.

3.2.19**Fabric Shortest Path First****FSPF**

link state protocol used for Path Selection

NOTE See FC-SW-3.

3.2.20**FC_Port**

port transmitting or receiving Fibre Channel frames

NOTE FC_Port includes any port type defined in the Fibre Channel family of standards (e.g., N_Port, F_Port, FL_Port, E_Port).

3.2.21**FL_Port**

L_Port that is able to perform the function of an F_Port, attached via a link to one or more NL_Ports in an Arbitrated Loop topology (see FC-AL -2)

NOTE The AL_PA of an FL_Port is 00h. In this Technical Report, an FL_Port is assumed to always refer to a port to which NL_Ports are attached to a Fabric; it does not include F_Ports.

3.2.22**Fx_Port**

Switch Port (see 3.2.52) capable of operating as an F_Port or FL_Port

3.2.23**Gateway/Bridge**

any device that interfaces FC to some other interface (see FC-FS-2)

NOTE The definition of such a device is outside the scope of this report.

3.2.24**Hub**

interconnect element used with Arbitrated Loops

NOTE A Hub may be a stand-alone enclosure, or part of an integrated system (e.g., such as the connection point within a JBOD). Typically a Hub is transparent to any connected Fibre Channel devices.

3.2.25**Interconnect_Port**

E_Port or a B_Port

3.2.26**Loop Fabric Address****LFA**

address identifier used to address an FL_Port (see FC-SW-3) for the purpose of loop management

NOTE See 6.4 and FC-LS.

3.2.27**L_Port**

port that contains Arbitrated Loop functions associated with the Arbitrated Loop topology

NOTE See FC-AL-2.

3.2.28

Managed Hub

Hub (see 3.2.24) that provides either in-band or out-of-band management functions

3.2.29

Name Server

Server (see 3.2.48) that allows registration and reporting of various objects

NOTE See FC-GS-4.

3.2.30

N_Port

direct Fabric-attached port that does not include NL_Ports

NOTE See FC-FS-2.

3.2.31

N_Port Identifier

1 Fabric unique address identifier by which an N_Port is known

NOTE The identifier is used in the S_ID and D_ID fields of a frame (see FC-FS-2).

2 Name Server object (see FC-GS-4) containing the Fibre Channel address identifier assigned to an N_Port or NL_Port

3.2.32

NL_Port

L_Port that is able to perform the function of an N_Port, attached to one or more NL_Ports and zero or more FL_Ports in an Arbitrated Loop topology

NOTE In this technical report, an NL_Port is assumed to always refer to a loop-attached port including both Private NL_Ports and Public NL_Ports, and does not include N_Ports.

3.2.33

Node_Name

identifier associated with a Fibre Channel node

NOTE See FC-FS-2.

3.2.34

Non-Participating mode

operational mode of an L_Port that does not have an AL_PA, but is enabled into the Loop

NOTE See FC-AL-2.

3.2.35

Nx_Port

port operating as an N_Port or NL_Port

3.2.36

OLD-PORT

state on a set of ports where two devices operate in a point-to-point mode utilizing FC-FS-2 protocols instead of FC-AL-2 protocols

NOTE See FC-AL-2 and FC-FS-2.

3.2.37

OPEN_INIT

state in the LPSM as defined in FC-AL-2

3.2.38**N_Port_Name**

identifier associated with an FC_Port

NOTE See FC-FS-2.

3.2.39**Partial Response**

response from a Distributed Service that may not have a complete set of data

NOTE See FC-SW-3.

3.2.40**Participating mode**

operational mode of an L_Port that has an AL_PA and is enabled into the Loop

NOTE See FC-AL-2.

3.2.41**Platform**

association of one or more nodes for the purpose of discovery and management

3.2.42**Port**

N_Port, NL_Port, F_Port, FL_Port, B_Port, or E_Port, used in a context where the distinction between specific port types is clarified by other text or not significant

3.2.43**Port Identifier**

lowest level of the three-level addressing hierarchy, found in bits 7 through 0 of an address identifier (see 3.2.1)

NOTE See FC-SW-3.

3.2.44**Private NL_Port**

NL_Port that is observing the rules of private loop behavior

NOTE See FC-AL-2 and FC-DA.

3.2.45**Public NL_Port**

NL_Port that attempts a fabric login and may transfer frames through the FL_Port

NOTE A Public NL_Port observes the rules of public loop behavior and/or private loop behavior. See FC-AL-2 and FC-DA.

3.2.46**Receiver_Transmitter_Timeout value****R_T_TOV**

time interval defined in FC-FS-2

3.2.47**Resource_Allocation_Timeout value****R_A_TOV**

time interval defined in FC-FS-2

3.2.48**Server**

entity that accepts CT requests and provides CT responses

NOTE 1 A Server is accessed via a Service (e.g., the Name Server is accessed using the Directory Service).

NOTE 2 See FC-GS-4.