

American National Standard

ANSI INCITS 258-1997
(formerly ANSI X3.258-1997)

*for Information Technology –
Fibre Distributed Data Interface (FDDI) –
Station Management-2 –
Isochronous Services (SMT-2-IS)*

Developed by



Where IT all begins



**American National Standard
for Telecommunications –**

**Fibre Distributed Data Interface (FDDI) –
Station Management-2 –
Isochronous Services (SMT-2-IS)**

**Secretariat
Information Technology Industry Council**

**Approved June 6, 1997
American National Standards Institute, Inc.**

Abstract

The described Station Management-2 Isochronous Services (SMT-2-IS) protocol is intended for use in a high-performance multi-station network. This protocol is designed to be effective at 100 megabits per second using a Token ring architecture and optical fiber or copper twisted pair as the transmission medium over distances of several kilometers in extent.

Contents

	Page
Foreword.....	vi
1 Scope	1
2 Normative references	3
3 Definitions.....	4
4 Conventions and abbreviations.....	7
4.1 Conventions.....	7
4.1.1 State machines	8
4.1.2 Addressing.....	9
4.1.3 Default and initial values	9
4.2 Abbreviations	9
5 General description	10
5.1 Overview of SMT-2-IS functions.....	10
6 Services.....	11
6.1 SMT-2-IS to user services	11
6.1.1 Logical Channel primitives.....	11
6.1.2 Isochronous Service Access Point (ISAP) primitives	20
6.2 SMT-2-IS to I-MAC services	25
6.2.1 SM_IM_CONTROL.request.....	25
6.2.2 SM_IM_SAP.request	25
6.3 SMT-2-PS to SMT-2-IS services	26
6.3.1 IS_PS_UNITDATA.request	27
6.3.2 IS_PS_UNITDATA.indication	27
6.4 SMT-2-CS to SMT-2-IS services	29
6.4.1 IS_CS_CONTROL.request	29
6.4.2 IS_CS_STATUS.indication	29
6.5 SMT to systems management services	30
7 Management information base (IS-MIB)	32
7.1 Management Information Base (MIB) structure.....	32
7.2 Integrity of MIB state	33
7.3 Management information definitions.....	34
7.3.1 MIB summary	34
7.3.2 Managed object class templates	35
7.3.3 Attribute group templates.....	38
7.3.4 Attribute templates	39
7.3.5 Action templates.....	42
7.3.6 Notification templates	42
7.3.7 ASN.1 definitions.....	43
7.3.8 Name Binding.....	45
8 Facilities	45
8.1 Variables.....	45
8.2 Flags.....	46
8.3 Timers.....	46
8.3.1 Timer functions	46
8.3.2 Timer expiration values	46
8.4 Signals.....	47

	Page
8.5 SMT frame format	47
8.6 Resource Allocation Frames (RAF)	48
8.7 RAF frame addressing	48
8.8 RAF frames	48
8.8.1 Allocate Logical Channel request	48
8.8.2 Modify Logical Channel request	49
8.8.3 Release Logical Channel request	50
8.8.4 Logical Channel Status request	51
8.8.5 Logical Channel response	52
8.8.6 Refresh Logical Channel announcement	52
8.8.7 Logical Channel Event announcement	53
8.8.8 WBC request/response	54
8.8.9 Refresh WBC announcement	55
8.8.10 WBC event announcement	56
8.8.11 Hybrid ring announcement	56
8.9 SMT-2-IS frame parameters	56
8.9.1 Resource type	56
8.9.2 CA command	57
8.9.3 User reference	57
8.9.4 Domain ID	57
8.9.5 Domain instance	57
8.9.6 Logical channel ID	57
8.9.7 Logical channel descriptor	57
8.9.8 Owner	57
8.9.9 New owner	58
8.9.10 Requested bandwidth	58
8.9.11 Minimum bandwidth	58
8.9.12 Maximum number T_Channels	58
8.9.13 Logical channel category	58
8.9.14 Refresh expiry	58
8.9.15 Abort flag	58
8.9.16 Authentication	58
8.9.17 Reason code	59
8.9.18 WBCA command	59
8.9.19 Allocation domain information	59
8.9.20 Requested WBC allocation	59
9 Operation	60
9.1 Overview	60
9.1.1 Isochronous bandwidth management	60
9.1.2 Isochronous service access	61
9.2 Wide Band Channel management	62
9.2.1 WBC allocation and release	63
9.2.2 WBC status	64
9.2.3 WBC refresh	64
9.2.4 WBC reclamation	65
9.2.5 Hybrid ring management	65
9.2.6 Hybrid Ring Announcement protocol	65
9.3 Logical Channel management	68
9.3.1 Logical Channel allocation	69
9.3.2 Logical Channel modification	71
9.3.3 Logical Channel release	72
9.3.4 Logical Channel status	73

	Page
9.3.5 Logical Channel refresh.....	74
9.3.6 Reclamation of allocation domain bandwidth.....	74
9.3.7 Allocation map verification.....	75
9.3.8 Channel allocator recovery	76
9.3.9 Access control.....	76
9.3.10 Encoding.....	76
9.4 ISAP management.....	76
9.4.1 ISAP creation	77
9.4.2 ISAP modification	77
9.4.3 ISAP deletion	78
9.4.4 ISAP to I-MAC binding.....	78
9.4.5 ISAP open and close.....	78
9.4.6 ISAP enable and disable	78
9.5 HI-SAP management.....	80
9.6 I-MAC management.....	80

Figures

1	SMT-2 Document Structure	2
2	SMT-2 Management Model.....	31
3	SMT Frame Format	47
4	Isochronous Bandwidth Management Structure.....	61
5	Wide Band Channel Management Operations	63
6	Hybrid Ring Announcement Transmitter state diagram	67
7	Logical Channel Management Operations	69

Annexes

A	Isochronous bandwidth management	81
A.1	Overview.....	81
A.1.1	Isochronous applications	81
A.1.2	Bandwidth partitioning	81
A.1.3	Isochronous management hierarchy	81
A.2	Wide Band Channel Allocator (WBCA).....	83
A.2.1	Resource management policies	83
A.2.2	Packet/Isochronous Partitioning Policy	83
A.2.3	Isochronous WBC allocation policy	84
A.3	Channel allocators.....	85
A.3.1	Channel allocation policies	85
A.3.2	CA call set-up involvement	86
A.3.3	Standby CAs (exemplary protocol).....	87
B	Call Signalling	88
B.1	Overview.....	88
B.2	Generalized FDDI-II Call Control model	88
B.3	Call set-up overview	91
B.3.1	Resource allocation phase.....	91
B.3.2	Call set-up agreement phase	93
B.3.3	Connection phase	94
B.3.4	Call disconnection (close down).....	94
B.4	Open Application Interfaces.....	94

Technical Committee X3T12 for Distributed Interfaces, which developed this standard, had the following participants:

Gene E. Milligan, Chair	Rajeev Agarwal	Scott Mindermann
Bernhard Albert, Vice-Chair	Richard M. Bailly	Akira James Miura
	Charles Brill	Patricia Moore
	Jack Brown	Kirk Moulton
	William Burr	Arun Patel
	Lca Cafiero	Tim Plunkett
	William Calvert	Liam Quinn
	Ramiro Calvo	James Reeves
	Brian Cashman	Everett O. Rigsbee III
	Steve Chen	Floyd Ross
	Stephen W. Cooper	(Vice-Chair during much
	William J. Cronin	of the development)
	John J. DeAndrea	Thomas Ruf
	Schelto van Doorn	Herb Schneider
	Albert L. Feaster	Michael Shoemake
	Bob Fink	Ramesh Sivakolunda
	Sian Gates	Carl J. Staab
	Martin Griffin	Don Staddon
	Robert M. Grow	Arlin Stone
	R. C. Halgren	Ed Sullivan
	Jim Hamstra	Pat Thaler
	Virginia F. Haydu	Geoff Thompson
	Carl Hatssen	David Thorne
	William Scott Hiles	James Torgerson
	Jack Himes	Andre Tracol
	Jerry Hutchison	Alan Truman
	James Johns	Koichi Tsuno
	James Jones	Ryan Tze
	Bryan B. Kim	Danny Waldron
	Reinhard Knerr	Yun-Che Wang
	Michael Jay Leib	Jeffrey Warren
	Robert Masterson	Keith Willete
	Vince Melendy	Mark Wood
	Dono van Mierop	

In particular the efforts of James Torgerson who served as project leader and the technical editor, and Mark Wood who served as the final technical editor are acknowledged.

INTERNATIONAL STANDARD

ISO/IEC
9314-5

First edition
1995-02-01

Information technology — Fibre Distributed Data Interface (FDDI) —

Part 5: Hybrid Ring Control (HRC)

*Technologies de l'information — Interface de données distribuées sur
fibre (FDDI) —*

Partie 5: Commande hybride par anneau (HRC)



Reference number
ISO/IEC 9314-5:1995(E)

Contents

Foreword	iv
1 Scope	1
2 Normative references	1
3 Definitions	2
4 Conventions and abbreviations	6
4.1 Conventions	6
4.2 Abbreviations	7
5 General description	8
5.1 Traffic types	9
5.2 Transmission facilities	9
5.3 Bandwidth management	11
5.4 Station structure	12
6 HRC services	16
6.1 PHY to H-MUX services	17
6.2 H-MUX to MAC services	18
6.3 H-MUX to P-MAC services	19
6.4 H-MUX to I-MAC services	21
6.5 H-MUX to SMT services	24
6.6 I-MAC to CS-MUX services	30
6.7 I-MAC to SMT services	32
7 Facilities	34
7.1 H-MUX symbol set	34
7.2 Cycle	34
7.3 HRC protocol parameters	38
7.4 Variables	39
7.5 Timers	42
7.6 Counters	43
7.7 Signals	43
7.8 Functions	44
8 Operation	44
8.1 Ring operation overview	44
8.2 Error recovery	50
8.3 Structure	53
8.4 Cycle acquisition	57
8.5 Cycle generation process	67
8.6 Cycle exchange process	84

© ISO/IEC 1995

All rights reserved. No part of this publication may be reproduced or utilized in any form or by any means, electronic or mechanical, including photocopying and microfilm, without permission in writing from the publisher.

International Organization for Standardization

Case postale 56 • CH-1211 Genève 20 • Switzerland

Printed in Switzerland

Annexes

A — Examples of the circuit-switch service class	86
B — FDDI station considerations	94
C — Isochronous call control procedures	99
D — Isochronous channel security	104
E — Isochronous bandwidth management	106
F — Logical ranking of monitors	108

Figures

Figure 1 — Structure of FDDI standards	3
Figure 2 — HRC cycle structure	8
Figure 3 — Hybrid mode traffic types	9
Figure 4 — Bandwidth management hierarchy	11
Figure 5 — Data flow through an FDDI-II monitor station	13
Figure 6 — Data flow through an FDDI-II non-monitor station	14
Figure 7 — Architectural block diagram of the H-MUX	14
Figure 8 — Architectural block diagram of the I-MAC.....	16
Figure 9 — H-MUX cycle structure at 100 Mbps	34
Figure 10 — H-MUX cycle header	35
Figure 11 — Example of wideband channel interleaving	37
Figure 12 — Example of wideband channel sorting	37
Figure 13 — H-MUX structure	54
Figure 14 — HRC receive state diagram	58
Figure 15 — WBC template filter state diagram	62
Figure 16 — HRC cycle control state diagram	68
Figure 17 — HRC cycle generate state diagram	76
Figure 18 — WBC template generation state diagram	83
Figure A.1 — Example of a byte interleave burst mode CS-MUX	87
Figure A.2 — Example of a bit interleave burst mode CS-MUX	88
Figure A.3 — Example of a bit interleave continuous mode CS-MUX	88
Figure A.4 — Example of 2048 kbps G.703/G.732 bridge and associated CS-MUX	90
Figure A.5 — Example FDDI-II to G.703/G.732 protocol layers	91
Figure B.1 — FDDI-II clock tolerance budget	96
Figure B.2 — Sinusoidal and triangular jitter waves	96
Figure B.3 — FDDI-II allowable input jitter vs. network maximum jitter	97
Figure C.1 — Isochronous channel reservation	100
Figure C.2 — Isochronous call establishment	101
Figure C.3 — Isochronous call released from destination station	102
Figure C.4 — Isochronous call released from originating station	102
Figure C.5 — Isochronous channel release	103