Summary of T10 Activities
to ISO/IEC SC 25 / WG 4

John Lohmeyer, Chair T10 Technical Committee
September 14, 2005

T10's principal physical interface work is the Serial Attached SCSI (SAS). The first ANSI SAS standard was published in 2003 (ANSI INCITS.376-2003). SAS-1.1 is nearing completion and should be published in the first half of 2006. It is an incremental improvement to SAS, containing a transport-layer retry mechanism to better support tape devices, a new compact connector option, and many minor improvements and bug fixes that became necessary as the industry developed products for SAS.

The SAS architecture leverages Serial ATA (SATA). SAS uses a drive connector that is compatible with the SATA drive connector. Subsystem vendors can develop products that use either kind of disk drive: SATA for cost-sensitive applications and SAS for enterprise-class applications that need the highest reliability and highest performance storage devices available.

The SAS architecture uses serial point-to-point links with circuit switches (called expanders) to provide fan-out to a large number of storage devices. The SAS expanders are relatively inexpensive because they do not attempt to store and forward packets. Instead, a full-duplex connection is established between the source device and destination device; then packets are routed through the connection with minimal FIFO buffering. SAS expanders can also be used with SATA drives to greatly increase the number of SATA drives accessible on a computer system.

SAS-1.1 continues to support 1.5 Gbit/sec and 3.0 Gbit/sec signaling rates -- no speed increases were included in SAS-1.1. Multiple connections between two devices may be simultaneously used to increase throughput. These are called wide links.

SAS is NOT intended to compete with Fibre Channel nor iSCSI. While SAS can support thousands of devices, it is intended for applications that require at most 10s of meters of distance, typically called "attached storage".

A SAS-2 project was recently started in T10. It will define a 6 Gbit/sec signaling rate, while continuing to support the lower signaling rates. Other features are being discussed for inclusion in SAS-2 such as zoning and bandwidth aggregation.

Another significant T10 activity related to SAS is a project to map SCSI commands to ATA commands, called SCSI / ATA Translation (SAT). This is a software layer standard that will enable operating systems to use their SCSI protocol stack with SATA disks in a standard way.

T10 also spends significant effort on the SCSI architecture, protocols, and command sets. Almost all modern I/O interfaces, including SCSI, SAS, Fibre Channel, SSA, IEEE 1394, USB, iSCSI, and ATAPI (ATA) use these standards.

The Figure below shows the relationship of these standards. With the exception of IEEE 1394, Fibre Channel, InfiniBand (tm), iSCSI, and the Internet, all of the standards shown are assigned to T10. A detailed status summary is included, below.
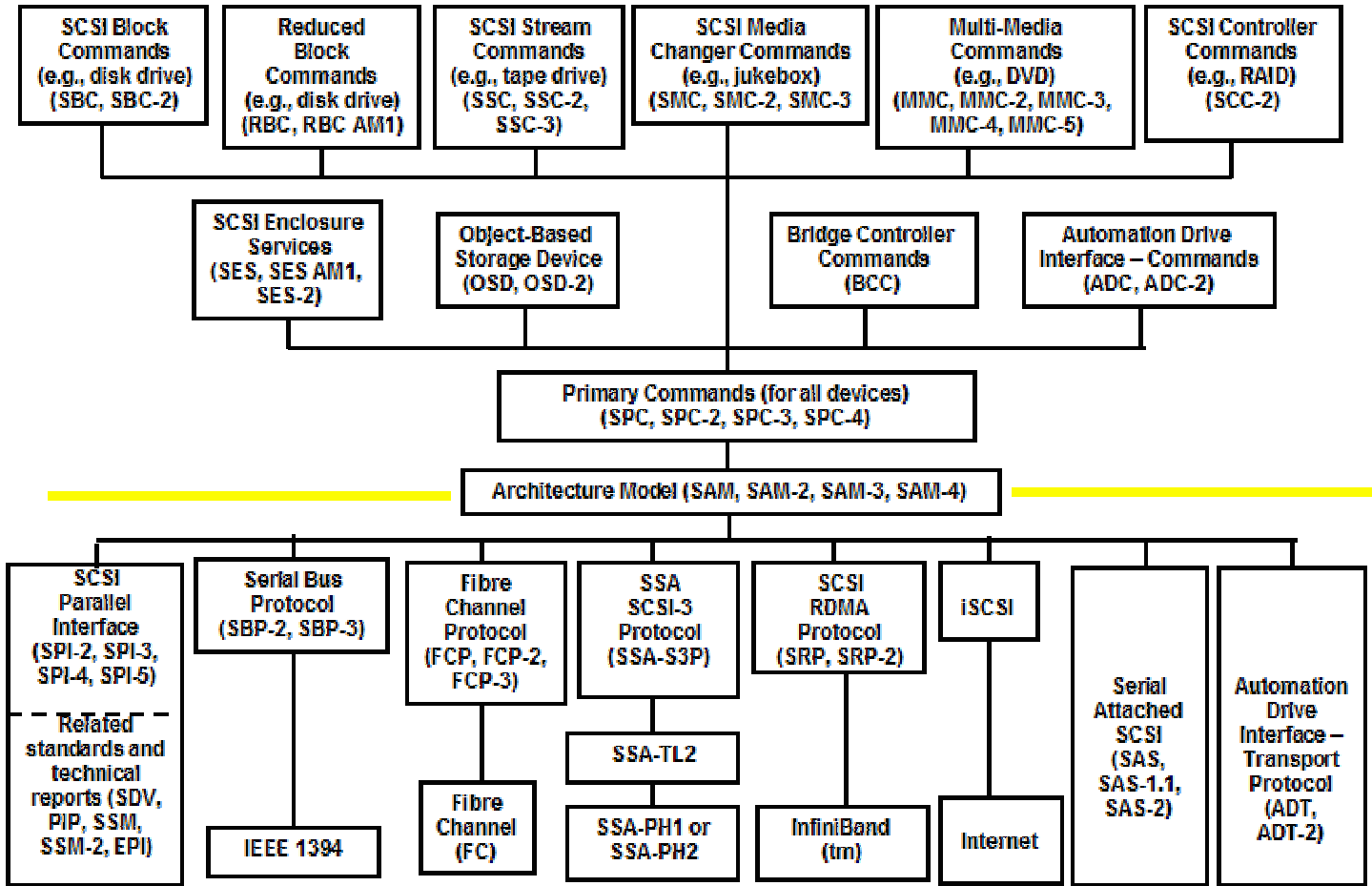
SCSI Standards Architecture

(See http:www.t10.org for the latest SCSI Standards Architecture diagram and the latest project status summary.)

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T10 Technical Committee Project Status Summary
(See the abbreviation key at the end)
              BSR      Proj                      Next    Target   Dist. in
Proj Name    Number   Number      Status        Action   Date    Mailing  Rev. PL/Editor
---------- ---------- ------- ------------------ ------------ --------- -------- ---- ----------------
                         P R O J E C T   P R O P O S A L S

                         D E V E L O P M E N T
ADC-2                 1741-D  in development     to INCITS   Nov 06    2005_5   02   Suhler / Entzel
ADT-2                 1742-D  in development     to INCITS   Nov 06    2005_2   00   Suhler / Entzel
BCC                   1528-D  in development     to INCITS   Nov 06    2004_5   00   Rob Elliott
MMC-5                 1675-D  in development     to INCITS   Nov 05    2005_4   01c  Bill McFerrin
OSD-2                 1729-D  in development     to INCITS   Nov 06    2004_6   00   Ralph Weber
SAT                   1711-D  in development     to INCITS   Dec 05    2005_5   05   Johnson /
                                                                                    Sheffield
SAM-4                 1683-D  in development     to INCITS   Nov 06    2005_2   02   George Penokie
SES-2                 1559-D  in development     to INCITS   Nov 05    2005_3   12   Rob Elliott
SMC-3                 1730-D  in development     to INCITS   Jan 06    2005_3   00   Banther /
                                                                                    Snelder
SPC-4                 1731-D  in development     to INCITS   Nov 09    2005_5   01a  Ralph Weber
SSC-3                 1611-D  in development     to INCITS   Nov 05    2005_5   01d  Dave Peterson
SAS-2                 1760-D  in development     to INCITS   Nov 06              __   Rob Elliott
SDI                   1740-D  in development     to INCITS   May 06    2005_2   00   Rob Elliott

                         T 1 0   A P P R O V A L
FCP-3                 1560-D  res T10 LB cmnts   to INCITS   Jul 05    2005_5   03i  David Peterson
SAS-1.1               1601-D  res T10 LB cmnts   to INCITS   Jul 05    2005_5   09e  Rob Elliott

                         I N C I T S   A P P R O V A L

                         P U B L I C A T I O N
SPC-3      INCITS 408 1416-D  at ANSI for        Publish     Sep 05    2005_3   23   Ralph Weber
                              publication


                         P U B L I S H E D
ADC        INCITS 403 1558-D  INCITS 403-2005    5 yr review 2010      2004_6   07   Suhler / Wideman
ADT        INCITS 406 1557-D  INCITS 406-2005    5 yr review 2010      2004_6   14   Suhler / Entzel
SCSI3 FCP  INCITS 269 0993-M  INCITS 269-1996    5yr review  2006      1995_3   12   Bob Snively
                              [R2001]
MMC-2      INCITS 333 1228-M  INCITS PR to       end PR      4 Jul 05  1999_4   11a  McFerrin /
                              reaffirm                                               Roberts
MMC-3      INCITS 360 1363-D  INCITS 360-2002    5 yr review 2007      2001_6   10g  Bill McFerrin
MMC-4      INCITS 401 1545-D  INCITS 401-2005    5 yr review 2010      2005_3   05a  Bill McFerrin
OSD        INCITS 400 1355-D  INCITS 400-2004    5 yr review 2009      2004_5   10   Ralph Weber
RBC        INCITS 330 1240-M  INCITS PR to       end PR      4 Jul 05  1999_4   10a  McLean / Roberts
                              reaffirm
RBC AM1    INCITS     1240-M  INCITS 330-2000/   5 yr review 2008      2003_3   01   Ron Roberts
           330/AM1            AM1-2003
SAM-2      INCITS 366 1157-D  INCITS 366-2003    5 yr review 2008      2002_5   24   Ralph Weber
SAM-3      INCITS 402 1561-D  INCITS 402-2005    5 yr review 2010      2004_5   14   Ralph Weber
SBC-2      INCITS 405 1417-D  INCITS 405-2005    5 yr review 2010      2004_6   16   Rob Elliott
SCC-2      INCITS 318 1225-M  INCITS 318-1998    5 yr review 2008      1997_5   04   George Penokie
                              [R2003]
SDV        INCITS TR- 1378-DT INCITS TR-28-2002  5 yr review 2007      2001_6   08b  Lohmeyer /
           28                                                                        Gibbons
SES        INCITS 305 1212-M  INCITS 305-1998    5 yr review 2008      1998_1   08b  Bob Snively
                              [R2003]
SES AM1    INCITS     1212-M  INCITS 305-1998/   5 yr review 2005      2000_4   01   Rob Elliott
           305/AM1            AM1-2000 [R2003]
EPI        INCITS TR- 1143-TR INCITS TR-23-1998                        1998_4   16   Bill Ham
           23
FCP-2      INCITS 350 1144-D  INCITS 350-2003    5 yr review 2008      2002_6   08   Dave Peterson
SMC-2      INCITS 382 1383-D  INCITS 382-2004    5 yr review 2009      2004_1   07   Erich Oetting
SPI-2      INCITS 302 1142-M  INCITS 302-1998    5 yr review 2008      1998_3   20b  Ham/Penokie
                              [R2003]
SPI-3      INCITS 336 1302-M  INCITS PR to       end PR      4 Jul 05  2000_3   14   George Penokie
                              withdraw
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Name	INCITS	Doc	Standard	Action	Year	Date	Rev	Editor
SPI-4	INCITS 362	1365-D	INCITS 362-2002	5 yr review	2007	2002_3	10	George Penokie
SPI-5	INCITS 367	1525-D	INCITS 367-2003	5 yr review	2008	2003_1	06	George Penokie
PIP	INCITS 368	1439-D	INCITS 368-2003	5 yr review	2008	2003_1	04	Zane Daggett / Bill Ham
SPC-2	INCITS 351	1236-D	INCITS 351-2001	5 yr review	2006	2001_4	20	Ralph Weber
SRP	INCITS 365	1415-D	INCITS 365-2002	5 yr review	2007	2002_4	16a	Cris Simpson
SSM	INCITS TR-29	1414-DT	INCITS TR-29-2002			2001_6	05	Larry Barnes
SSM-2	INCITS 369	1514-D	INCITS 369-2003	5 yr review	2008	2003_1	05a	Aloisi / Manildi
SSC-2	INCITS 380	1434-D	INCITS 380-2003	5yr review	2008	2003_4	09	Dave Peterson
S2TIB1		0375-T	Pub by Global	(none)		1995_1	E	George Penokie
S2TIB2		0375-T	Pub by Global	(none)		1995_1	E	
SCSI CAM	INCITS 232	0792-M	INCITS 232-1996 [R2001]	5yr review	2006	1995_3	12b	Bill Dallas
SCSI3 SAM	INCITS 270	0994-M	INCITS 270-1996 [R2001]	5yr review	2006	1995_4	18	Charles Monia
SCSI3 SBC	INCITS 306	0996-M	INCITS 306-1998 [R2003]	5 yr review	2008	1997_6	08c	open
SCSI3 GPP	INCITS TR-16	0991-TR	INCITS TR-16-1997			1995_2	09	Gary Stephens
SCSI3 SMC	INCITS 314	0999-M	INCITS 314-1998 [R2003]	5 yr review	2008	1998_1	10a	Erich Oetting
SCSI3 MMC	INCITS 304	1048-M	INCITS 304-1997 [R2002]	5 yr review	2007	1997_3	10a	Ron Roberts
SCSI3 SPC	INCITS 301	0995-M	INCITS 301-1997 [R2002]	5 yr review	2007	1997_2	11a	Ralph Weber
SCSI3 SSC	INCITS 335	0997-M	INCITS PR to reaffirm	end PR	4 Jul 05	2000_1	22	Dave Peterson
SAS	INCITS 376	1562-D	INCITS 376-2003	5yr review	2008	2003_4	05	Rob Elliott
SBP-2	INCITS 325	1155-M	INCITS 325-1998 [R2003]	5 yr review	2008	1998_2	04	McLean/Johansson
SBP-3	INCITS 375	1467-D	INCITS 375-2004	5 yr review	2009	2003_5	05	Peter Johansson
SCSI-2	INCITS 131	0375-M	INCITS 131-1994 [R2004]	5 yr review	2009		10L	Larry Lamers
SSA-PH1	INCITS 293	1145-M	INCITS 293-1996 [R2001]	5yr review	2006	1996_4	09c	Ham/Scheible
SSA-PH2	INCITS 307	1146-M	INCITS 307-1997 [R2002]	5 yr review	2007	1997_2	05b	Ham/Scheible
SSA-S2P	INCITS 294	1121-M	INCITS 294-1996 [R2001]	5yr review	2006	1996_4	07b	John Scheible
SSA-S3P	INCITS 309	1051-M	INCITS 309-1997 [R2002]	5 yr review	2007	1997_2	05b	John Scheible
SSA-TL1	INCITS 295	0989-M	INCITS 295-1996 [R2001]	5yr review	2006	1996_4	10b	John Scheible
SSA-TL2	INCITS 308	1147-M	INCITS 308-1997 [R2002]	5 yr review	2007	1997_2	05b	John Scheible
SMD-E	INCITS 91	0053-M	INCITS 91M-1987 [R2002]	5 yr review	2007			open

T10 Technical Committee Project Status Summary Abbreviation Key:

X3	= Obsolete name for INCITS	comp	= completion	cur	= current
NCITS	= Obsolete name for INCITS	res	= resolve/resolving	rev	= revision
INCITS	= InterNational Committee for Information Technology Standards	LB	= Letter Ballot	#	= number
		pub	= published	ng	= negative
OMC	= Operational Management Committee	aprvl	= approval	prep	= preparation
BSR	= Board of Standards Review (of ANSI)	aprv	= approve	cmnts	= comments
WG4	= Working Group 4 of ISO/IEC JTC 1/SC 25	dev	= development	prj	= project
ISO	= International Standards Organization	SD3	= Project Proposal	fwd	= forward
MgtRev	= INCITS management review	T10	= T10 Technical Committee	doc	= document
1PR	= 1st Public Review	.1	= T10.1 Task Group (obsolete)	TG	= Task Group
2PR	= 2nd Public Review	CD	= Committee Draft (ISO)	rec	= recommend
TBD	= To Be Determined	DIS	= Draft International Stnd	reaf	= reaffirm
		NP	= New Project	w/dw	= withdraw
		IS	= International Standard	rvis	= revise
		A/I	= ANSI/ISO/IEC (joint standard)		