

Date: Feb 24, 1993

X3T9.2/93-046 rev 0

To: X3T9.2 Committee (SCSI)

From: Tom Hanan

Subject: SFF Local Bus Meeting Minutes

NOTE - THIS IS NOT AN X3T9.2 ACTIVITY. THESE MINUTES ARE PROVIDED COURTESY OF THE SMALL FORM FACTOR COMMITTEE TO KEEP MEMBERS OF X3T9.2 APPRISED OF THIS ACTIVITY.

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SFF  
Local Bus ATA  
Working Group  
2/24/93  
Meeting Minutes Doc#: SFF/93s007r0

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II) Group Introductions:

The meeting was formally started at 9:30am. In all, 24 people from 13 companies attended. Apple and IBM representatives from the last meeting did not attend this meeting. This follows a general trend in our industry where system houses show up once or twice to explain their needs and then let the drive industry work out the details. As an example, Compaq submitted a PIO and DMA timing proposal addressing EISA based systems.

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Adaptec	Mike Medal	408 945-2557	408 945-0711
	Al Pham	408 957-4804	408 262-2533
	Yen Lin	408 945-8600	408 262-2533
Appian	Ken Curt	408 730-5406	408 730-5473
Cirrus Logic	John Geldman	510 226-2368	510 226-2150
	Joseph Chen	510 226-2101	510 226-2170
	Nicos Syrimis	510 226-2153	510 226-2170
Conner	Mark Gurkowski	303 682-8317	*303 682-8787
Emulex	Phil Rafnel	714 688-5435	
Hewlett Packard	Levi Lebo	208-323-4652	208 323-3319
Maxtor	Ron Roberts	408 432-3875	408 432-3773
	Larry Lamers	408 432-3889	408 432-3833
Micronics	Chuang Li	510 651-2300	510 651-9450
National Semi.	Robbie Shergill	408 721-7959	408 721-7956
Quantum	Jim McGrath	408 894-4504	408 894-3208
	John Brooks	408 984-5871	408 894-3255
	Jim Henson	408 894-5115	408 894-3207
	Will Akin	408 894-5180	408 894-3207
	Steve Huang	408 894-5740	408 894-5667
	Clyde Nagakura	408 894-4215	408 894-5664
Segate	Gene Milligan	405 324-3070	405 324-3794
	Hale Landis	408 439-2443	408 438-4190
	John Masiewics	408 438-2152	408 439-4190
TI	Dean Wallace	214 997-5973	214 997-5962
Western Digital	Tom Hanan	714 932-7472	714 932-7314

\* NOTE: Indicates that Company does not have access to SFF reflector E-Mail. Please send faxes for changes in the meeting schedule.

Congratulations everyone, there is only one company on the working group that has not yet hooked into the SFF Reflector! With any luck they will

have joined their colleagues on the reflector by our next meeting.

III) Update on Working Group Status:

Tom Hanan convened the meeting as an SFF working group. Tom indicated that future meetings would continue to be held under SFF and that the recommendations identified by the group would be published as an SFF specification. The Published SFF specification would then be forwarded to ATA extensions as a recommendation. Tom acknowledge that the working group must maintain a close liaison with ATA extensions to improve acceptance down the road. Tom made an observation that this should not be difficult since most of the working group members also attend the ATA Extensions meetings.

IV) Time And Place of Next Meeting:

It was agreed that the next meeting would be held at the same location on March 25th at 9:30am. (Holiday Inn Milpitas) Call Jim McGrath at 408 894-4504 if you need directions.

V) Review Of 1-28-93 Working Group Meeting [Tom Hanan] (SFF/93s001r0):

Tom Hanan walked the group through the Minutes of the last working group meeting. Cirrus logic wished to correct the record by stating that they had not agreed to act as the focal point for work on the DMA mode. Tom apologized for the mistake and Cirrus agreed to act as the focal point for DMA timing in the future.

VI) Review of Remaining Agenda:

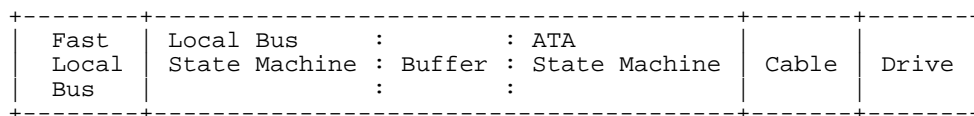
No changes were made to Jim's proposed agenda, However several participants asked if the meeting might be adjourned around 3pm to allow them to make their flights.

VII) Compaq Request on PIO & DMA Timing [Dale Evans] (SFF/93s003r0):

Compaq submitted a proposed timing modification to the existing PIO and DMA timing modes intended to support EISA based systems. This sparked a discussion on how the group proposed to add new modes and if so would we add modes which were only slightly different. The groups conclusion was that these timings were so close to the existing ATA timings that they should be forwarded to the ATA extensions group. The group also acknowledged that the PIO mode words should be redefined to identify support for individual timings. The rest of the discussion was deferred until the Cirrus presentation on PIO mode word and timing definition.

VIII) New Timing Mode [John Geldman] (SFF/93s005r0):

John Geldman presented a position paper that argued for a flow control mechanism to achieve higher data throughput. His model assumed some logic existing between the drive and the local bus.



At this point a debate vectored off on the model. Some folks want a model that has no logic between the drive and the local bus to minimize cost, while others felt that the performance gains of having the logic outweighed the cost. The consensus for the time is that the signals need to be buffered but that the use of a FIFO for speed matching data transfers was not required.

John then proceeded to outline his proposal based on a PIO flow control which does not really exist today which could use IOCHRDY. The main points were:

- Protocol for graceful degradation
- add to word 49 bit 10 defined as IOCHRDY supported
- add to word 49 bits 11-15 reserved for future flow control
- word 51 PIO mode supported (currently in ATA)
- add word 64 bits 15-8 - flow control for PIO mode supported

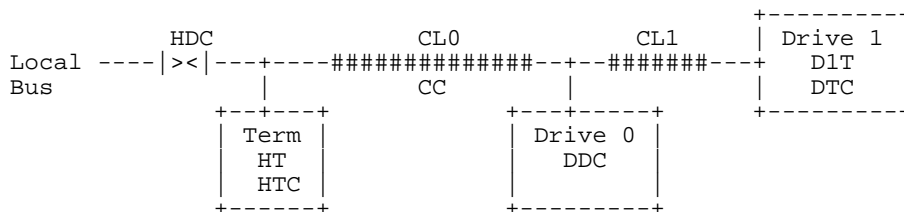
Jim McGrath suggested using DREQ/DACK for PIO flow control instead of IOCHRDY based on the following points:

- Many Systems do not connect IOCHRDY signal
- Systems are connecting the DREQ/DACK signals
- IOCHRDY is subject to many delays in propagation
- IOCHRDY is a unidirectional signal, with no confirmation from host

Tom Hanan stated that WD has an adapter card implementation that uses a special terminator on IOCS16 to eliminate noise. On the WD card the IOCS16 signal is generated locally and the signal between the card and the drive is pulled to the active state. Essentially this eliminates IOCS16 as a propagation delay issue and eliminates the noise IOCS16 induces into the adjacent interrupt signal. Using these techniques Tom indicated that WD could successfully achieve PIO data transfer rates > 8MB/sec without changing the existing drivers. TOM indicated that the technique is probably covered by one of WD Patents or a Patent Pending. The WD model is based on the traditional ATA IDE port with minimal buffering and no state machine. Tom feels that the group should not require significantly different system interface hardware since it is possible to achieve reliable high performance in low cost systems without it.

IX) Signal Quality Enhancement [Wallace] (SFF/93s004r0):

Dean Wallace requested input on the parameters to be used to model the electrical characteristics of local bus ATA. The group responded in an interactive conversation with the following model and preliminary assumptions:



Description	Label	Min	Max
Host Driver Cap.	HDC	0	25pf
Host Terminator Cap.	HTC	0	25pf
Host Terminator	HT (TBD/TBD)		
Cable Length 0	CL0	0	18"
Cable Length 1	CL1	0	8"
Cable Length Max	CLM = CL0+CL1	0	18"
Cable Capacitance	CC (Cap./ft)	0	TBD
Cable Impedance	CI (Ohms)	70	100
Cable Type	CT	Unshielded	
Cable Noise Freq.	CNF (Mhz)	100	100
Cable Noise RiseFall	CNRF (ns)	1	1
Drive Driver Cap.	DDC	0	25pf
Drive 1 Terminator	D1T (TBD/TBD)		
Drive Terminator Cap	DTC	0	0pf
Drive Term Stub Dist	DTSD	0	3.5"
Tranceiver RiseFall	TRF(ns@10/90)	3	5
Tranceiver DC Curr.	TDC (ma)	8	12
Tranceiver AC Curr.	TAC (ma)	24	40
Input Hysteresis	IH	0	N/A

There is a desire to go to 24 inch long cables for tower systems. It is assumed all cable is flat ribbon type using insulation displacement connectors.

It was also noted that implementing termination at the drive could be a serious problem due to ground shift and the lack of a Tempwr signal in the existing 40 pin cable.

Since it had been decided that un-buffered signals would not be allowed the 33 pf capacitance specification of VL-Bus was not relevant. The consensus was to go with a value based on the SCSI-3 SPI work. The limit will be 25 pf per device (drive 0, drive 1, host, and terminator each count as a device).

Dean Wallace stated that any of the SCSI terminators would work. The 24 ma dc requirement could be lowered by allowing a higher transient (>40 ma).

There are really two environments to consider: the desktop where power consumption is not as restricted and longer cables are desirable; and the notebook, where power consumption is critical, but the connection distance is very short. If was felt that the notebook environment had workable solutions today and that the initial focus should be on the desktop.

John Goldman suggested 12 ma dc max to reduce the ground bounce problem. Higher currents through grounds causes shifts that are detrimental to signal quality. This is directly related to the fact that there is no tempwr through the cable.

Tom Hanan requested that one model be run with termination only on the host side.

It was suggested that we need to categorize signals into those that are edge sensitive and those that are not. This would allow less expensive transceivers on signals that did not require them. The group felt that for now all signals should be treated the same, as edge sensitive.

The suggested noise source to induce was cross talk 5-10% and 100 Mhz signal with 1-2 ns rise time in a cable with same impedance laying on the ATA cable.

The ATA signals will have a 100ns period and a 40-60% duty cycle. No filtering will be applied.

The transceivers will use a rise time specification of 5 ns at 10-90 0v to Vcc with a hysteresis in receiver of 600 mv centered @ 1.4 v (STD TTL ????).

Dean Wallace suggested that a negation driver at 20ma dc for IOCHRDY be used. It was questioned if 20ma was really needed.

X) Decoupling Local Bus from IDE Timing [Ken Curt] (SFF/93s002r0):

Because the decision was already made to require buffered signals, this was not a controversial presentation.

Ken Curt presented the Appian implementation of a local bus ATA adapter. He outlined the benefits that could be gained in performance by decoupling the local bus and ATA bus timings.

XI) Enhanced Error Reporting [Hanan] (SFF/93s006r0):

Tom Hanan presented a proposal on reporting of deferred errors, underflow, and overflow exceptions. Tom stated that the problem is the last data transfer has no status returned. While most of the market has not seemed to be bothered by this, in existing desktop application, Microsoft & Novell see this as a significant issue for future high performance ATA based workstations and file servers.

Tom indicated that while the use use of a SET FEATURES to select a modified protocol was simpler than adding new commands, it would likely cause more problems than it would solve. Tom reported that Microsoft has stated they would "never ever require use of set features in OS drivers because of the inherent danger in allowing multiple drivers to select different features. Configuration is allowed during POST by the BIOS."

The only backward compatible solution is to adopt a new opcode (command) similar to the existing read command. The new command would return some form of extended status at end of the data transfer. Old BIOS and drivers would continue to be compatible since they would use the older Opcodes. New BIOS and drivers could selectively implement the new Opcodes the address the blind transfer issue in workstation and file server applications.

Jim McGrath pointed out the very limited number of implementations of READ/WRITE MULTIPLE commands, even though a 20-30% performance gain could be had if only the BIOS implementations were modified to support it. Tom Indicated that he did not think that the BIOS would ever implement the new instructions. However, the Microsoft and Novel O/S drivers would.

Most folks were loath to add new commands, especially when it came to light that at least two new commands would be needed, one for normal reads and one for multiple sector reads. There are several other problems with multiple sector transfers that need to be addressed as well.

Tom suggested that a single new Read Multiple Opcode addressing the existing issues and the blind transfer would be sufficient to address the issue.

XII) New Business:

The Following Individuals/Companies signed up to present proposals for the next meeting:

Cirrus (John Geldman)PIO Timing with Flow Control (IOCHRDY & ??)  
DMA Timing

TI (Dean Wallace)Summary of Sim Results  
Termination & Driver Recommendations

WD (Tom Hanan) Detailed Proposal for Enhanced Error Reporting  
Min VESA Hardware Definition

Remember in order to maximize productivity of the working group meetings, documents for presentation and discussion should be sent to the SFF reflector at least one week prior to the meeting. Documents received after 3/18/93 will be presented as NEW Business.

It is Ok to E-Mail preliminary versions of your presentations or proposals! Preliminary presentations and proposals do NOT need Document Numbers. Larry will assign a number to the final document presented at the working group meeting.

After the meeting Larry Lamers informed us that he and Dal have agreed that Larry will assign the document numbers for SFF documents. In order to help everyone keep track of which documents refer to what I have and will continue to embed the document numbers in the working groups Minutes. I will also include a directory of all working group documents at the end of the Minutes.

Document Number AuthorDescription

Document Number	Author	Description
SFF/93s001r0	T. Hanan	Minutes of 1/28/93 SFF Local Bus Working Group
SFF/93s002r0	K. Curt	Buffered vs De-Coupled Implementations
SFF/93s003r0	D. Evans	New PIO and DMA Timing Requirements
SFF/93s004r0	D. Wallace	Signal Quality Enhancement
SFF/93s005r0	J. Geldman	Higher Performance ATA PIO Modes
SFF/93s006r0	T. Hanan	ATA Enhanced Error Reporting
SFF/93s007r0	T. Hanan	Minutes of 2/24/93 SFF Local Bus Working Group

12.0 Adjournment:

Jim and Tom adjourned the meeting at 3:45pm to allow as many people as possible to catch early flights home.

13.0 Volunteer Support:

Special thanks to Larry and everyone else who provided input for these min in E-Mail form. Remember your proposals and comments will get to people several weeks faster if you use the SFF E-Mail Reflector!!!! It also makes it easier on Larry and I who volunteer our time.

Special thanks to Jim McGrath from Quantum for providing first class meeting facilities at the Holiday Inn (Milpitas).

Remember, using the SFF Reflector to pre-distribute information a week or more before our working group meetings, will keep our meetings productive.

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