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Date: 21 Apr 2005
Reply to: Mark Evans

To: Membership of T13
From: Mark Evans, Secretary of T13, and Dan Colegrove, Chairman of T13
Subject: Minutes of 52nd T13 Plenary Meeting at Longmont, CO, hosted by Seagate.
April 19th to April 21st, 2005

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Results of the Meeting

1 Opening remarks

Dan Colegrove, the T13 Chair, called the meeting to order at 9:00 A.M. on Tuesday, April 19th, 2005. Dan thanked Jim Hatfield of Seagate for hosting the meeting.

As is customary, the people in attendance introduced themselves, and a copy of the attendance list was circulated. Copies of the agenda were made available to those in attendance.

The Chair briefly reviewed the meeting rules: T13 is a Technical Committee of INCITS and operates under INCITS rules. Anyone with interest in the work of the committee is free to attend and take part in discussions. However, motions and votes are limited to member organizations, one vote per member organization.

The Chair also noted that T13 operates under the INCITS antitrust guidelines. There should never be discussion of the following topics at any INCITS or an INCITS subgroup meeting:

- Any company's prices or pricing policies;
- Specific R&D, sales and marketing plans;
- Any company's confidential product, product development or production strategies;
- Whether certain suppliers or customers will be served;
- Prices paid to input sources; or
- Complaints about individual firms or other actions that might tend to hinder a competitor in any market.

Policies and Procedures and antitrust guidelines for INCITS are available at the web site at www.incits.org. T13 operates under these policies and procedures augmented by the T13 procedures at the T13 web site at www.t13.org.

2 Approval of agenda

Dan Colegrove reviewed the agenda. No new items were added to the agenda. Curtis Stevens moved and Jim Hatfield seconded, that the agenda be approved. The motion passed with unanimous consent.

3 Membership and attendance

The Chair reviewed the rules for membership and attendance:

3.1 Membership

An individual from an organization new to T13 must attend at least one T13 plenary meeting before requesting voting membership. After that meeting, the representative may request membership from the T13 chair stating expertise and material interest in the scope of the

committee and pay the required fees to INCITS. The time when membership becomes effective has just changed. Membership now becomes effective at the start of the next meeting the organization attends assuming the organization attends one of the next two meetings.

3.2 Fees

Current INCITS memberships fees for Principal or additional Alternates are 800.00 USD. The First Alternate is free with a Principal membership.

Mailings of committee documents are available to any interested party after each plenary meeting. The cost for mailings for one year is 300.00 USD for mailing in the USA and 400.00 USD for mailing to a location outside of the USA.

Persons with questions or requests regarding membership fees and/or subscriptions for mailings should contact Parthenia Purnell, ITI Standards Operations, at ppurnell@itic.org.

3.3 Attendance

In addition to payment of fees, there are also minimum attendance and participation requirements to maintain voting membership status on T13. A representative from a member organization must attend two of every three plenary meetings and vote on at least every other letter ballot. If a member organization fails to have a representative in attendance at two of the last three T13 plenary meetings or vote on every other letter ballot, they are warned that failing to attend the next T13 meeting or to vote on the next letter ballot will result in their voting membership being terminated.

Attendance at a working group meeting does not affect voting membership status in T13.

The T13 voting membership during the meeting was 20 organizations.

The number of eligible voting members required for establishing a quorum was 7. 10 Member organizations were present at the start of the meeting, thus a quorum was present.

The following individuals attended the meeting:

Name	Company
Barras, Larry	Apple
Alvarez, Candy	CPR Tools
Alvarez, Tony	CPR Tools
Hirata, Ken	Emulex
Puri, Sumit	Fujitsu
Colegrove, Dan	Hitachi GST
Bellamy, Wayne	H-P
Livaccari, Steve	IBM
Dees, Brian	Intel
Grimsrud, Knut	Intel
Sheffield, Bob	Intel
Strong, Robert	Intel
Hawks, David	Iomega
Breher, Joe	Lingua Data
Thompson, Tim	LSI Logic
Evans, Mark	Maxtor
Myers, James	Maxtor
Obr, Nathan	Microsoft
Shu, Frank	Microsoft
Elkins, Greg	Qlogic
Schadegg, John	Samsung
Hatfield, Jim	Seagate
Wilson, Aaron	ST Microelectronics
Arakawa, Yutaka	Toshiba
Luksic, Mladen	Western Digital
Masiewicz, John	Western Digital
Stevens, Curtis	Western Digital

4 Approval of the minutes from the previous T13 Plenary Meeting

Curtis Stevens moved and Jim Hatfield seconded, that the minutes of the previous meeting be approved. The motion passed with unanimous consent.

5 Document distribution

The following documents were distributed either via hard copy, soft copy, or both:

Agenda

6 Review of previous action items

6.1 Review of open issues

1. Dan Colegrove to forward SCT form 1 and associated documents to INCITS. [Completed.]
2. Mark Overby to prepare project proposal for HBA-2 to incorporate the parallel emulation from ATA/ATAPI-7. [Carry over.]
3. Dan Colegrove to query CFA on the use of SET FEATURES subcommand codes. [Carry over.]
4. Curtis Stevens will assign a minor revision for ATA-7 ANSI published version in the minor revisions of IDENTIFY DATA. [Carry over.]
5. Dan Colegrove to query Gordon Hughes about the status of the freeze lock proposal. [Completed.]
6. Curtis Stevens to liaison with Mt. Fuji and MMC on the proposal to obsolete ATAPI overlap and queuing. [Completed.]
7. Dan Colegrove to check with INCITS about the anti-trust implications for the SATA-IO proposal. [Carry over.]
8. Jim Hatfield to work on a proposal to create a procedures document for T13 activities. [Completed.]
9. Mark Evans will research if a separate letter is needed from Maxtor for a Quantum patent related to UDMA that was released for ATA-5 and subsequent project. [Carry over.]
10. Nathan Obr to bring a proposal to clarify the behavior as to what hosts shall expect and devices shall do when a command is not supported and for how to report unsupported commands. [Owner changed to Curtis Stevens.]

7 Old business

7.1 ATA/ATAPI-7 Project 1532D

7.1.1 INCITS status

Dan Colegrove reported that the project is going to be published imminently. John Masiewicz reported that INCITS has approved all of the final edits and that the last step needed is for INCITS to establish a price for the document.

7.1.2 ISO status

Once the document has been published, the ISO process can begin with Gary Robinson leading this effort.

7.1.3 ATA/ATAPI-7 Errata

Dan Colegrove published the ATA/ATAPI-7 errata document (e05108r0) that contains the device signature issue. Dan Colegrove stated that he would like to keep this document open for 4 months to capture any further errata that may be noted after the document has been published.

7.2 EDD-3 Project 1572D Status

7.2.1 INCITS status

Curtis Stevens reported that the public review closed with no comments and that he had received minor comments from the editor. Curtis stated that he accepted the editorial comments.

7.3 SCT Technical Report Project DT1701

7.3.1 INCITS status

Dan Colegrove reported that public review for SCT has not yet been scheduled by INCITS.

7.4 ATA/ATAPI-8 projects

7.4.1 AT Attachment-8 – Architecture Model

7.4.1.1 Draft review [Evans]

Mark Evans reviewed a preliminary version of the next revision of the draft showing changes made as a result of the last working group meeting and showing how he intends to describe the ATA protocols.

7.4.1.2 UML Conversion for state diagrams [Overby]

This agenda item was deferred to the next meeting.

7.4.2 AT Attachment-8 – ATA/ATAPI Command Set (ATA8-ACS)

Curtis Stevens reviewed revision 1d of the draft document with the primary focus being on the editor's notes.

7.4.2.1 HPA State Diagrams proposal (e03124r4) [Zelenko]

Jim Hatfield moved and Dan Colegrove seconded that the HPA state diagrams be included in ATA-8. The motion passed: 12:0:1.

7.4.2.2 READ WRITE VERIFY proposal (e04129r5) [Puri]

Sumit Puri moved and Jim Hatfield seconded that the proposal be included in ATA-8. The motion passed: 8:1:3.

7.4.2.3 Download Microcode Enhancements [Livaccari]

Steve Livaccari reported that the issues that were raised appear to be resolved and he requested that the item be deleted from future agendas.

7.4.2.4 Secure Erase Freeze Lock proposal

Dan Colegrove reported that Gordon Hughes told him that a T13 member company would be constructing the proposal. There was some discussion that this item may be dropped in the future.

7.4.2.5 ATAPI Command Overlap and Queuing Obsolescence [Stevens]

Curtis Stevens reported the MMC group told him at the March T10 meeting that no ATAPI devices use command overlap as described in the ATA standards. Curtis Stevens moved and Mark Evans seconded that this feature be removed from ATA-8: The motion passed: 11:0:2.

7.4.2.6 Queuing Control Mechanism (e05110r0) [Overby]

In Mark Overby's absence, review of the document was deferred to a subsequent meeting.

7.4.2.7 Non Volatile Proposal (e05106r1) [Obr]

Nathan presented the next revision of his proposal for NV buffer control. This includes changes to the ATA standards that are needed to include commands for controlling the NV cache and disabling/enabling the NV cache, as well as identifying the NV cache capabilities. Nathan agreed to make a new revision of his proposal including input from the meeting.

7.4.2.8 Add SCT to ATA/ATAPI-8

Curtis Stevens moved and Larry Barras seconded that SCT be incorporated into ATA-8. Dan Colegrove spoke against the motion, stating that the technical report was not even complete yet. Curtis responded that it would be simpler to make changes after the document was included in the standard. The motion failed 4:5:4.

Company	Incorp SCT in 8
Apple Computer	Barras Y
Emulex	Hirata A
Fujitsu	Puri A
Hitachi GST	Colegrove N
IBM	Livaccari Y
Intel	Strong A
LSI Logic	Thompson N
Maxtor	Evans N
Microsoft	Obr A
NetCell	np
nVidia	np
Pacific Digital	np
Phoenix Technologies	np
Qlogic	np

Company	Incorp SCT in 8
Samsung	Schadegg Y
Seagate	Hatfield N
Sillicon Image	np
ST Microelectronics	np
Toshiba	Arakawa N
Western Digital	Masiewicz Y

7.4.2.9 SCT BIST Proposal [Stevens] (e04148r1)

Curtis Stevens reported that there are no changes from the last meeting. This is still being discussed in the SATA-IO group, and Curtis stated that he would include their input in the next revision of the proposal. Curtis stated that this material will be included in the SCT proposal.

7.4.2.10 Report power on settings/current settings

As an owner for this item can not be determined, this will be removed from future agendae.

7.4.2.11 Long sectors issues

7.4.2.11.1 Long Physical Sector Alignment proposal (e05119r0) [Barras]

Larry Barras presented a proposal on how LBAs should be aligned in long physical sectors. The proposal states that LBA 0 shall be the first 512 bytes of the first physical sector of a device.

7.4.2.11.2 Logical Sector Alignment proposal (e05120r0) [Hatfield]

Jim Hatfield presented a proposal on how LBAs should be aligned in long physical sectors. The proposal allows LBA 0 to be other than the first 512 bytes of the first physical sector of a device, but includes a method of reporting how LBA 0 is aligned within a physical sector.

7.4.2.11.3 WD Comments on >512 Byte Sectors white paper [Stevens] (e05122r0)

Curtis Stevens presented a tutorial on sector sizes greater than 512 bytes. Curtis stated that the intent of this white paper is to identify the issues and offer possible solutions.

Curtis stated that we need hosts to align to a certain position. Curtis stated, and Jim Hatfield agreed, that we should keep the 5xx-byte logical sector size.

The consensus of the group was that we could not make a decision about any of these issues today.

7.4.3 AT Attachment-8 – Parallel Transport (ATA8-APT)

7.4.3.1 Review Draft

In Mark Overby's absence, review of the document was deferred to a subsequent meeting.

7.4.4 AT Attachment-8 – Serial Transport (ATA8-AST)

John Masiewicz noted that the PDF he sent out did not have the change bars enabled and that you needed to open the DOC file to see the changes. John then led a review of the changes to the document that he has made for revision 0b.

7.4.4.1 Device Initiated Power Management (e04149r0) [Masiewicz]

John Masiewicz and Mladen Luksic reviewed WD's presentation again at the request of Jim Hatfield. John stated that they would construct a proposal including input from the group. This item will be moved to the ACS section, as that is the document to which the proposal will apply.

7.4.4.2 Detecting PATA Device behind SATA Bridge [Overby]

In Mark Overby's absence, this item was deferred to a subsequent meeting.

7.5 DRQ=0 when ERR=1 Technical Report project [Livacarri] (e05105r1)

Steve Livacarri reviewed the latest draft of his project proposal for a technical report to describe a work around for behavior when DRQ=0 when ERR=1.

7.5.1 Project approval

Steve Livacarri moved and Jim Hatfield seconded to approve this as a project. Curtis Stevens requested a roll call vote. The motion passed 14:0:1.

Company	DRQ Project Vote
Apple Computer	Barras Y
Emulex	Hirata Y
Fujitsu	Puri Y
Hitachi GST	Colegrove Y
IBM	Livaccari Y
Intel	Strong Y
LSI Logic	Thompson Y
Maxtor	Evans Y
Microsoft	Obr Y
NetCell	np
nVidia	np
Pacific Digital	np
Phoenix Technologies	np
Qlogic	Elkins Y
Samsung	Schadegg Y
Seagate	Hatfield Y
Sillicon Image	np
ST Microelectronics	Wilson Y
Toshiba	Arakawa Y
Western Digital	Masiewicz A

7.5.2 Draft review [Livacarri] (e05104r0)

Steve Livacarri reviewed revision 0 of the proposal that will become the first draft. There was some discussion about where the IDENTIFY DEVICE information should be documented and about how much space remained in that information. Steve agreed to include the input from the meeting in the first draft of the technical report (assuming the project is approved by INCITS).

7.6 A/V Technical Report project (d1612r0) [Colegrove]

Dan Colegrove stated that there had been no activity on this project due to lack of meeting time, but, with the longer meeting format, that we could now make progress on this project.

7.6.1 Draft review

Dan Colegrove reviewed revision 0 of the draft and asked that people bring in any comments. Mark Evans stated that several customers have indicated that they did not wish to use the log structures. Mark said he wanted to construct a proposal to make the logs obsolete or optional. The feeling of the group was that they should be made optional.

7.7 T13 reflector, FTP, and web site setup

Dan Colegrove reported that there were no issues reported regarding the reflector or web site.

8 New Business

8.1 ATA-5 five year maintenance

Dan Colegrove reported that ATA/ATAPI-5 is up for 5-year maintenance, and he recommended that the standard be renewed because that is where much Compact Flash information is contained.

8.1.1 2/3 vote

Curtis Stevens moved and Greg Elkins seconded that the T13 recommend to INCITS that the standard be renewed. The motion passed 14:0:0.

8.2 Items from the T13 reflector

8.2.1 SRST and ATAPI

There was a concern that there was text missing about the behavior of the DSC bit and the ATAPI device for soft reset capability. The text describing the behavior is in ATA/ATAPI-7 volume 2, clause 11.2.

Jim Hatfield agreed to send a response.

8.2.2 ATA/ATAPI-7 flow control

Bob Sheffield had posted a question that was answered by Greg Elkins on the reflector.

8.2.3 UDMA question

A person from LSI posted a question that was answered directly by Tim Thompson.

Jim Hatfield requested that responses to reflector questions be sent to the reflector or, at least, that he should be copied on the responses so that he can ensure that items are resolved.

8.3 Removable media feature set

Curtis stated that he knows of no one using this feature set and would like to make it obsolete in ATA-8. Curtis said that he would send a note to the reflector and create a proposal to obsolete this command set (see e05127r0)

9 Liaison Reports

9.1 T10 [Colegrove]

The T10 liaison report was posted to the web.

9.1.1 SCSI to ATA Mapping (SAT) working group

Bob Sheffield reported that the SAT group met the Monday before the T13 meeting. Bob stated that there was an issue with DOWNLOAD MICROCODE where SCSI supports segmentation and ATA does not, and the group was working on how to deal with that.

9.1.1.1 Working group co-location

Bob reported that the SAT working group would like to meet on the Monday previous to the June T13 meeting, but that the host has not yet made arrangements to accommodate this request.

9.2 T11

9.2.1 FC-SATA presentation (e05125r0) [Hirata]

Ken Hirata made a presentation on a protocol that Emulex is proposing to T11. He stated that he is presenting this to T13 because this protocol allows the transport of SATA FISs over Fibre Channel.

9.3 Trusted Computing [Hatfield]

Jim Hatfield reported that TCG is preparing a proposal for the next T10 meeting in May and will most probably bring a proposal to T13 at the next meeting in June.

9.4 SFF [Colegrove]

Dan Colegrove stated that he was not aware of any activities to track.

9.5 IDEMA [Colegrove]

Dan Colegrove reported that there has been no activity with the 4k committee since the last T13 meeting.

Dan Colegrove reported that the CD/EDMA working group is considering endorsing CE/ATA as the interface to use for 1" and smaller devices.

9.6 MMCA (Multi Media Card) [Colegrove]

There is no liaison report for this meeting.

9.7 Compact Flash Association

Dan Colegrove reported that the next meeting for CFA will be May 23rd through 25th in Kauai, HI. Dan asked if anyone was planning to attend and make a liaison report, as T13 currently has no liaison for this group.

9.8 SATA-IO [Dees]

Brian presented document e05123r0 that outlines his role as the liaison between T13 and SATA-IO. There was much discussion about trying to not allow divergence between the content of the ATA standards and the SATA-IO specifications.

Brian presented document e05124r0 that is his SATA-IO liaison report for this meeting. John Masiewisz moved and Tim Thompson seconded that clause 14.4.8 in ATA/ATAPI-7 be marked as obsolete in the errata document that Dan Colegrove is developing for ATA/ATAPI-7. The motion passed: 15:0:0.

John Masiewisz agreed to craft some words in ATA-8 ST to replace the word "freeze" with words that better describe the condition and include a recommendation for host response.

9.8.1 Copyright clearance for ATA8 project

Dan Colegrove reported that he had made a presentation to the SATA-IO board of directors about how T13 operates and why the copyright clearance is needed. Dan stated that the SATA-IO BOD has not yet decided how they want to deal with this issue. Knut Grimsrud stated that the SATA-IO BOD wants to minimize duplication of material but has not yet determined the best way to do this. Discussion between the two groups will continue.

10 Call for Patents

The Chair explained the patent policy. A document is available from ANSI, "Procedures for the Development and Coordination of American National Standards", at no charge. This document is also on the INCITS web site at ftp://www.incits.org/help/ansi_sdo.html. Section 1.2.11 contains the ANSI patent policy. Amy Marasco manages patent issues for ANSI and can be contacted at amarasco@ansi.org or 212-642-4954.

The Chair then called for patents and/or patent applications that may be necessary to comply with the requirements in T13 standards, draft standards, technical reports, or draft technical reports.

There was no response to the call for patents.

11 Review of Action Items

- Mark Overby will construct a project proposal for HBA-2 to incorporate the parallel emulation from ATA/ATAPI-7.
- Dan Colegrove will query CFA on the use of SET FEATURES subcommand codes.
- Dan Colegrove to check with INCITS about the anti-trust implications for the SATA-IO proposal.

- Mark Evans will research if a separate letter is needed from Maxtor for a Quantum patent related to UDMA that was released for ATA-5 and subsequent project.
- Curtis Stevens will construct a proposal to clarify the behavior as to what hosts shall expect and devices shall do when a command is not supported and for how to report unsupported commands.
- Dan Colegrove will construct a document to propose how T13 and SATA-IO might work together.
- Curtis Stevens will construct a proposal to recommend how devices report support for the new ATA standards.
- Hard Drive vendors are to find out if their drives spin down when they receive a STANDBY command.
- Curtis Stevens to bring in a proposal to include in the definition of DF, that a device requires a power on reset after reporting device fault.
- Dan Colegrove will forward the DRQ=0 when ERR=1 Technical Report Project proposal to INCITS.
- Hard Drive vendors (particularly Dan Colegrove) are to find out if their drives use the I/O and C/D bits.

12 Schedule

12.1 Authorization of Ad Hoc Working Groups

Dan Colegrove moved and Mark Evans seconded that up to three teleconferences be authorized for the SATA-IO liaison process. The motion carried unanimously.

12.2 Long term meeting schedule

The meeting dates, locations, hosts, and contacts were reviewed through CY2006 (included below).

2005 Dates	Location	Host	Contact
June 21-24, 2005	Irvine, CA	Western Digital	John Masiewicz.
August 23-25, 2005	Longmont, CO	Maxtor	Mark Evans
October 18-21, 2005	Las Vegas, NV*	Fujitsu	Sumit Puri
December 13-16, 2005	Las Vegas, NV	Hitachi Global	Dan Colegrove
2006 Dates	Location	Host	Contact
February 21-24, 2006	Orange County, CA	Western Digital	John Masiewicz.
April 18-21, 2006	Cupertino, CA	Apple*	Larry Barras
June 20-23, 2006	Seattle, WA	nVidia	Mark Overby
August 22-25, 2006	Longmont, CO	Maxtor*	Mark Evans
October 24-27, 2006	Las Vegas, NV	Fujitsu*	Sumit Puri
December 12-15, 2006	Las Vegas, NV	Hitachi Global	Dan Colegrove
2007 Dates	Location	Host	Contact
February 20-23, 2007*			
April 24-27, 2007*			
June 19-22, 2007*			
August 21-24, 2007*			
October 23-26, 2007*			
December 11-14, 2007*			
* Tentative			
NOTE – Meetings are scheduled for 3.5 days.			

12.2.1 Hosting Volunteers

nVidia offered to host the June 2006 meeting.

13 Adjournment

Mark Evans moved and Jim Hatfield seconded that the meeting be adjourned at 12:10 PM on Thursday, April 21, 2005. The motion passed with unanimous consent.

Membership

Name	S	Company	Tel	Address	City
Larry Barras	P	Apple Computer	408 974-3220	1 Infinite Loop MS306-2tc	Cupertino, CA 95014
Randy Sharp	A	Apple Computer	408-974-5024	6 Infinite Loop	Cupertino, CA 95014
Tony Alvarez	P	CPR Tools	863 674-0120	730 E Cowboy Way	LaBelle, FL 33935
Candy Alvarez	A	CPR Tools	863 674-0120	730 E Cowboy Way	LaBelle, FL 33935
Kenneth Hirata	P	Emulex	714 662-5600	3333 Susan St.	Costa Mesa, CA 92626
Sumit Puri	P	Fujitsu	408 829-5252	23160 Hatteras St	Woodland Hills, CA 91367
Dan Colegrove	P	Hitachi GST	702 614-6119	2903 Carmelo Dr	Henderson, NV 89052
Steve Livaccari	P	IBM	919 543-7393	3039 Cornwallis Rd.	RTP NC 27709
Robert Strong	P	Intel	916 356-0616	1900 Prairie City Rd	Folsom, CA 92618
Brian Dees	A	Intel	503-712-7761	2111 NE 25th Ave.	Hillsboro, OR 97124
Tim Thompson	P	LSI Logic	970 206-5753	2001 Danfield Ct	Fort Collins, CO 80525
Mark Evans	P	Maxtor	408 894-5310	500 McCarthy Blvd	Milpitas, CA 95035
James Meyers	A	Maxtor	303-678-2076	2452 Cloud Basin	Longmont, CO 80503
Frank Shu	P	Microsoft	425-707-1779	One Microsoft Way	Redmond, WA 98052
Nathan Obr	A	Microsoft	425 705-9157	One Microsoft Way	Redmond, WA 92630
Scott Richmond	P	Net Cell	303 545-2383	7360 Olde Stage Rd	Boulder, Co. 80302
Charles Seaborg	A	Net Cell			
Mark Overby	P	nVidia	425 417-9412	1430 NE 24th Suite 203	Bellvue, WA 98007
Scott Pritchett	A	nVidia			
Robert Horton	P	Pacific Digital	949-252-1111	2052 Alton Parkway	Irvine, CA 92606
Stefan Thurnhofer	A	Pacific Digital	949 252-1111	2052 Alton Parkway	Irvine, CA 92606
Karen Zelenko	P	Phoenix Tech.	408 570-1418	915 Murphy Ranch Rd.	Milpitas, CA 95035
Timothy_Markey	A	Phoenix Tech.	408-570-1624	915 Murphy Ranch Road	Milpitas, CA 95035
Greg Elkins	P	Qlogic	303 651-1919	6134 Utica Ct.	Longmont, CO 80504
Arie Krantz	A	Qlogic			
Joe Chen	P	Samsung	408 544-5766	75 W Plumeria Dr.	San Jose, CA 95134
John Schadegg	A	Samsung	408 544-5838	75 W Plumeria Dr.	San Jose, CA 95134
Jim Hatfield	P	Seagate	720 684-2120	389 Disc Drive	Longmont,CO 80503
Marc Noblitt	A	Seagate	720 684-1177	389 Disc Drive	Longmont, CO 80503
Raymond Liu	P	Silicon Image	949 470-3152	9501 Jeronimo Rd	Irvine, CA 92618
Mark Hartney	A	Silicon Image	408 616-4197	1060 E. Arques Ave.	Sunnyvale, CA 94085
Aaron Wilson	P	ST Microelectro	303-381-3585	1625 S. Fordham Suite 500	Longmont, CO 80503
Glenn Lott	A	ST Microelectro	303 381-3549	1625 S Fordham Suite 500	Longmont, CO 80503
Yutaka Arakawa	P	Toshiba		9740 Irvine Blvd	9740 Irvine Blvd
John Masiewicz	P	Western Digital	949 672-7686	20511 Lake Forest Dr	Lake Forest, CA 92630
Curtis Stevens	A	Western Digital	949 672-7933	2011 Lake Forrest Dr.	Lake Forrest, CA 92630