

Minutes of 1394 PWG Meeting
-- May 18-19, 1998 - Crystal City, VA --

1. Meeting Attendees

Takashi Isoda	Canon (DO Project)
Atsushi Nakamura	Canon
Akihiro Shimura	Canon
Lee Farrell	Canon Info Systems
Peter Johansson	Congruent Software
Greg LeClair	Epson
Fumio Samitsu	Epson
Fumio Nagasaka	Seiko Epson
Atsushi Uchino	Seiko Epson
Brian Batchelder	Hewlett Packard
Alan Berkema	Hewlett Packard
Scott Bonar	Hewlett Packard
Laurie Lasslo	Hewlett Packard
Greg Shue	Hewlett Packard
Jerry Thrasher	Lexmark
Don Wright	Lexmark
John Fuller	Microsoft

2. Administrivia

Don Wright gave the next 1394 PWG meeting details:

- * July 6-7
- * Monterey Marriott
- * Monterey, CA

Greg LeClair presented the meeting goals and proposed agenda topics:

- * Introductions
- * p1212r activities
- * IP over 1394
- * SBP-2
- * Imaging Profile
- * Dynamic LUNs
- * Config ROM
- * Command Set

3. p1212r Activities

Greg LeClair suggested that the IEEE 1212 meeting could be co-located in Monterey with the next 1394 PWG meeting in July. This will be proposed to the 1212 group.

3.1 FDS

Atsushi Nakamura gave a presentation on the Scope and Objectives of FDS. He reviewed the past activity of the 1212 group and its progress. At the last meeting there was a new concept raised about Discovery.

He explained that there is a need for Function Discovery because we need a common, protocol/bus independent method for finding and describing a function in a multi-device (node) topology. This concept was approved as a need by the IEEE MSC. FDS was adopted as part of Sony's SDD proposal.

The objective of the Function Discovery scheme is to provide a unit (protocol) independent method for (initial) Function Discovery. "Discover the gross functions first, then their supported protocols-and further function description." This approach is can be in addition to other methods of function discovery, and is not intended as the only method.

Scope of FDS:

1. Provide gross functional information

2. Provide pointers to associated directories
3. Provide detailed information about the function

3.2 PDS

At the last 1212 meeting, a new concept called Profile Discovery System was proposed. According to Nakamura-san, a Profile describes a particular set of ROM information, including details about the function description, model information, protocol description, and other information. Nakamura-san stressed that the information of FDS is orthogonal and independent of the PDS information. The two methods should not be viewed as competing alternatives, because in fact they achieve different goals-and could even co-exist together in the same implementation. (Nakamura-san even identified that a Profile directory could possibly be pointed to from the Function directory, but he was not necessarily suggesting this.)

Nakamura-san believes that a drawback of the Profile scheme is that there will be a huge number of different Profile IDs to represent each unique combination of device information. This will create an unrealistic amount of overhead to maintain within a device.

Summary points:

- * Protocol independent Function Discovery is necessary
- * PDS and FDS have different objectives-they are not alternatives to each other

Nakamura-san provided several possible examples on how the Function Directory could be used for certain applications. As a preface to his examples, he showed a diagram describing the connections of several 1212 directories, including:

- * Root Directory
- * Vendor Directory
- * Unit Directory
- * Function Directory
- * Function Affinity Directory
- * Function Information Directory

Nakamura-san's slides will be posted on the website.

3.3 More PDS

Greg LeClair provided more background on the PDS concept that was discussed at the last 1212 meeting. He said that several of the ideas were similar to the FDS proposal, but used different names. A Profile Pointer points to a Profile List ID which points to a Profile ID which points to a Feature. According to LeClair, the Profile ID is similar to the Spec ID.

Brian Batchelder asked why PDS was raised. Greg said that some people felt that FDS did not adequately (efficiently?) address the Affinity Directory and Function Information Directory details. The PDS concept was the result of discussions for considering a different approach to deal with these shortcomings. However, so far no one has volunteered to take responsibility for developing the PDS concept into a detailed, formal proposal.

4. SBP-2

Fumio Nagasaka distributed a copy of a White Paper on SBP-2 Printing under Existing Consumer PC Operating Systems. He says that 2 or 3 Operating Systems will be offering SBP-2 support this year (Windows and Macintosh.) He believes that Microsoft will have a beta available for Win NT 5.0 later this summer.

He discussed how it is possible to provide upward compatibility with the

1394 PWG future standard. He believes the existing driver stack will allow for support of 1394 PWG standard.

According to Nagasaka-san, the 1394 PWG target shall provide a second LUN in configuration ROM and NT 5.0 SR1 shall load a "1394 PWG LUN controller."

During the discussion, Brian Batchelder said that as of last week, Microsoft has modified their intended implementation. They will now support more than just LUN 0. Additional LUNs will also be supported.

Brian cautioned the group that we should not depend on existing elements within Windows to remain the same in Windows NT 6.0.

Nagasaka-san's presentation will be posted to the web site.

5. PWG-C/PWG Joint Meeting

The next PWG-C meeting will be a joint meeting with the PWG and is planned for June 9 (and 10 if necessary) in the Tokyo area. It is currently being proposed as a 1394 DSI WG "off-cycle" meeting, but this has not yet been confirmed. It is expected to get final agreement on DPP, followed by a submission for vote at the July DSI meeting. Unfortunately, this meeting is in conflict with the next pl212 meeting that is scheduled for the same days. It was suggested that perhaps the PWG-C meeting could be re-scheduled (to the following week?) to allow people to attend both meetings. Another alternative suggested was to hold a video or telephone conference to enable participation at both meetings.

Nakamura-san contacted Shinoda-san (PWG-C chairman) about the possibility of changing the meeting time to June 16 and 17. Any of the PWG members that can attend should contact Nakamura-san and let him know as soon as possible.

6. Imaging Profile

Alan Berkema explained that many updates have been made to the current draft of the Imaging Profile. The document is still missing a section for the Command Set.

Some of the material in the Profile document is redundant with other material in the SBP-2 and IEEE 1212 documents. It was suggested that these sections be removed and replaced by a reference to the appropriate document.

6.1 Dynamic LUNs

Alan discussed his diagram on Dynamic LUNs. The topic attempts to capture the discussion at the previous meeting that we use a Dynamic Logical Unit scheme to multiplex applications to device functions. For example, in order to implement a Multifunction Device (MFD) as a single Unit Directory, some type of multiplexing must be done to make the individual functions of the device available to one or more applications simultaneously.

At the previous meeting, it was proposed that applications Login to LUN 0 and then receive the Dynamic Logical Unit that will be used for that application's connection.

To help the discussions, it was suggested that the group agree on the definitions for Service and Function. This turned out to be a difficult task, and people agreed that there is some overlap of terminology. For example, some implementations may treat status as a Function while other implementations treat status as a Service. Proposed definitions were generated, but not necessarily agreed to or finalized:

- * Functions - capabilities like printing, faxing, modem communication;
- "Units", one-to-one mapping with device drivers
- * Service - "Logical Unit"
- "A capability provided by one protocol layer entity for use by a higher layer or by a management entity."
- "A subcomponent of a unit that operates on a set of tasks independently of other services, and is accessed by a the device driver software."

Brian raised the issue of whether status and control span multiple Functions/Services (such as printing and scanning in an MFD.) An alternative example is to keep the status and control mechanisms separate for each individual Function/Service. It would be possible to have all of them report as busy if any one of them is active.

One possible model of a multi-drive CD device was described as two separate entities: the actual drive and the CD changer (i.e. control) mechanism. It was suggested that one LUN could be a "controller" that is responsible for (all) the other LUNs.

If synchronization between Functions is necessary, this will have to be done outside SBP-2. Once you need a separate synchronization mechanism, you may as well have it also be responsible for multiplexing to the separate Functions.

Greg LeClair identified two different configurations for target models of three separate functions (print, scan, fax) within a device:

- * three separate nodes
- * one single node multiplexed to three separate functions

Both of the above configurations led to an architectural model of a Root directory pointing to a Unit directory (Function) pointing to a LUN (Service).

In conclusion, the group determined that Dynamic LUNs are not necessary. They did not want to modify SBP-2 or create a "hack" on top of it. In order to support multiple Logins from the same initiator to the same target on the same LUN, you must provide a multiplexing layer above the PWG profile that will provide this functionality.

6.2 Config ROM

The group agreed on the following "NEEDs":

- * General format
- * Bus Information Block with unique EUI-64
- * Root Directory
- * Module_Vendor_ID (and textual descriptor that provides a human readable message that identifies the vendor)
- * SBP-2 Unit Directory
- * At least one Unit Directory
- * LUN 0 with Device type field
- * Unit_Spec_ID = 00609Ih
- * Unit_SW_Version = 010483h
- * Vendor ID, Model ID and textual descriptors (with informative annex that discusses implementation considerations under Windows O/S and adoption of Unicode for internationalization)
- * p1394a enhancements
- * generate bits
- * FDS

It was noted that the textual descriptors should not be used to determine feature capability or behavior.

The question of what OUI will be used for the command set Spec ID remains as an unresolved issue.

ACTION ITEM: Greg LeClair will send the modification notes for the CSR

section to Alan Berkema so that he can include them in the next Profile draft.

6.3 Command Set

Greg Shue led a discussion about the possible Command Set considerations. He shared several ideas that he has been thinking about, saying that he has not yet worked out a detailed proposal. He listed the following commands as likely candidates:

- * Send buffer
- * Get buffer
- * Set parameter
- * Get parameter

The following parameters were identified:

- * Read only: SND BUF cmd queue size
- * Read only: GET BUF cmd queue size
- * Read only: MAX SEND BUF data block size
- * Read only: MAX GET BUF data block size
- * Read/write: Unsolicited Status Enable Write Timeout [?]

NOTE: The items marked with "[?]" indicate questions by the group about whether it is necessary or not.

For each command:

- * 1 byte for command and command result
- * 1 byte for sequence number unique to command [?]

Send buffer

- 32 bit length
- 1 bit out-of-band
- 1 bit end of message [?]
- 1 bit abort message [?]

Get buffer

- 32 bit length
- 1 bit out-of-band
- 1 bit end of message [?]
- 1 bit abort message [?]
- 1 bit more data available

Get Parameter and Set Parameter

- * 16 bit parameter ID (add OUI to parameter tag?)
- * 64 bit parameter value (parameter list with tags?)

Although Cross Login may not be necessary, is it the best solution for peer-to-peer? A few individuals felt that we should not spend time exploring Cross Login further.

The group discussed the possible needs for segmentation and reassembly of single commands that may span more than one ORB buffer and issues related to handling multiple commands within a single ORB buffer. If we can depend on there only being one message per buffer, there might not be any need for the "end of message" bit.

The idea of a sequence number for the buffer was rejected until someone could come up with a clear proposal for using it under error recovery situations.

The group agreed that we should explain that the initiator should always post a read as soon as it is able. Given this policy, it is probably not necessary to have a "more data available" bit.

Peter suggested that the parameters should be obtainable via Get Parameter as a list. This could be achieved in a <tag, length, value> (TLV) format. For Set Parameters, the same TLV format could be used.

Each tag would identify a specific parameter. Perhaps this could be accomplished.

Greg will write up the conclusions of the discussions about possible command details and produce a draft document for review by the group.

The other command set proposal that is still available for consideration is the SHPT command set.

Peter Johansson suggested that we consider reserving two bits in the ORB for a "queue ID" that identifies one of four possible values:

- * 00 Control (blocks; no forward progress until done)
- * 01 Inbound (maximum depth NI)
- * 10 Outbound (maximum depth NO)
- * 11 Vendor-dependent (maximum depth NV)

The group felt that Peter's proposal was more flexible, but a few people were concerned that it creates unnecessary complexity.

Peter later modified his proposal to reserve only 1 "queue" bit. He also suggested that instead of tracking the maximum depth of each queue, only the total maximum is needed. As long as the initiator doesn't exceed this maximum, there will be sufficient room to avoid blocking.

6.4 SHPT Command Set

Shimura-san discussed his latest ideas for the SHPT Command Set. (The draft document will be posted after he returns to Japan.) He presented a diagram that introduces a "channel management agent" to the previous SHPT draft. He listed four different command categories:

- * Handled by WRITE execution agent
- * Handled by READ execution agent
- * Service dependent
- * Channel management commands

Each of the command formats was presented.

It was noted that one outstanding issue to be resolved is the method for handling "channelization." SHPT uses two queues per channel. (It may be possible to have many channels per Login, but do we want it? No.) Can we benefit by having more than two queues?

6.5 Encoding

Greg Shue led the discussion of how things should be encoded. The group identified the following items:

CDB encodings

1 bit queue identifier
7 bits command field (save range for vendor-dependent command)
24 bits OUI

parameter commands

8 bits parameter identifier

parameters

16 bits max "across both queues" (max task set size) - read-only
32 bits max data size per ORB (inbound) - read-only
32 bits max data size per ORB (outbound) - read-only
2 bits duplex mode: bi-di, send only, receive only, off (reserved) - read/write

status block

8 bits error code
32 bits residual
1 bits tag field (out-of-band)

64 bits vendor-dependent information

6.6 Draft Review

Alan Berkema wanted to review the updates to the Profile document that were made to include the SHPT proposal. Greg Shue will work with Alan and Shimura-san to modify the Profile to include the Command Set items that were discussed today. The updated document will be distributed via e-mail for review prior to next meeting. There will be a "page-turner" review of the next revision at the next meeting.

The group decided that unsolicited status will be considered "out-of-scope" for the Profile document. Alan will remove the existing material in the document on this topic.

7. SBP-2 Draft Update

Peter Johansson announced that the latest version of SBP-2 has now been posted.

8. Future Activity

Upcoming 1394 PWG-related meetings are scheduled as follows:

July 6-7
Monterey, CA

Aug 17-18
Toronto, Canada

Sep 28-29
Charleston, SC

Nov 9-10
Phoenix, AZ

Dec 14-15
San Diego, CA