1394 Printer Working Group
Atlanta Meeting - 9/15 & 9/16

Attendees:

Don Wright	Lexmark / PWG Chair
Greg LeClair	Epson / 1394PWG/1212 Task Group Chair
Larry Stein	Warp 9 / 1394PWG Secretary
Brian Batchelder	HP / 1394 PWG Editor
Fumio Nagasaka	Seiko Epson
Yoshinori Murakami	Epson
Atsushi Nakamura	Canon
Osamu Hirata	Canon
Shigeru Ueda	Canon
Akihiro Shimura	Canon
Brian Nagy	Kodak
Jerry Thrasher	Lexmark
Greg Shue	HP
Alan Berkema	HP
Lee Farrell	Canon
Randy Turner	Sharp

Agenda

I. Introductions

II. Next meetings:
Boulder/Denver 10/27 & 10/28
Los Angeles 12/1 & 12/2
Hawaii (January - TBD)

III. Meeting Plan:
- FDS
  - Presentations
  - Discussion
- Transport
  - Presentations
  - Discussion
- Documents
  - Sub-working group(s) on 9/16 afternoon & 9/17 all day

IV. How to bring closure and issue results
- FDS proposal (PWG & PWG-C)
- SBP-2 based printer definition (PWG)
- FCP based printer definition (PWG-C)
- IP/1394 based printer definition (TBD)

Meeting called to order at 8:38 by PWG chair Don Wright.
$42 per day meeting charge.

I. Introductions

II. Next meetings:
Boulder/Denver 10/27 & 10/28

Boulderado Hotel
2115 13th St.
Boulder, CO 80302
Ph. 303-442-4344
Reservations 1-800-433-4344
$104 standard

$114 Deluxe

The October meeting could not be moved because the meeting contracts have already been completed.

Los Angeles 12/1 & 12/2

1998 Schedule:
Hawaii (January - TBD)
Jan 19-23 or 26-30

(Schedule proposal to be posted separately. - GL)

Don Wright asked Greg LeClair to approach 1394 TA Steering Committee if future meetings could be arranged +/- 1 week to allow attendance by members from PWG-C at both meetings.

1394PWG meeting started here.
Greg LeClair - Chair

III. Meeting Plan:

Ats Nakamura, Canon made presentation on the PWG-C.
PWG-C met in September. The FDS will be a PWG-C proposal to PWG. The PWG-C expects to present the Direct Printing Proposal at the DSI working group at the 1394TA. Target date for 1st draft is October.

III.A. FDS
- Presentations
- Discussion

Please refer to spec posted on the pwg web site: FDS05.PDF

"How do we find a printer in a multi-device topology?"
We don't want to utilize a specific protocol just to find a function in a topology. Other proposals include:
SDD - Self Describing Devices (Sony proposal)

Add key "mode_unit_id" to 1212 structure.

We should define what we mean by "Independent" functions as used in the 'function_class' key.

The 1394PWG will seed the initial function_class keys. The list will be extensible and maintained by the IEEE RAC. The initial list will include:
printer
scanner
fax
multi-function

Motion made by Larry Stein to adopt the FDS Ver. 0.5 specification as the basis for Function Discovery for 1394PWG. This will become Version 0.1 of the PWG1394 Function Discovery specification.
This includes:
- New root entry for FDS support
- Point to directory of function descriptor.
- Configuration change flag
- Function_List definition and contents
- Function_Description definition and contents

Seconded by Randy Turner, passed without objection.

Open issues for fds05 include:
- Exact number of keys
- Exact format of keys and fields
- Driver info block
- Does a suitable global registry exist?
- Do we make the registry extensible?
- Do we make the registry bus dependent?
- Do we seed the registry with certain functional classes?

Plug and Play (Microsoft PnP spec for 1394) requires a separate unit directory for each function. This is different than the current implementation for SBP2 and AV/C protocols.

End of day 1.

Day 2
Meeting called to order at 8:45AM

III.B Transport
- Presentations

III.B.1 Greg Shue -- Parallel Port Replacement Protocol Requirements
Outline of services that are provided on a parallel port that may need to be provided on a 1394 system. This may be used as a set of requirements with which to measure transport protocol options.

Required services to emulate connectivity of the parallel port:
- Connection Oriented
  - Access Control
- Reliable
  - Guaranteed Data Delivery
  - Flow Control
  - Error Detection
  - Error Correction/Recovery
- In Order Data Delivery
- Service Discovery

Direct Print Protocol requirements as defined by PWG-C for thin layer:
(R is a requirement as determined by 1394PWG, W is a want)

R 1- Symmetrical Connection
  - Peer to peer start of connection

R 2- "Real Time" Processing
  - Unsolicited Status indication

R 3- Multi-channel
  - Independent channels for Command and Data, for example

W 4- Dynamic allocation of memory
  - Full usage of 1394 memory model
  - (not like FCP with fixed window location and size)

R 5- Flow control of Command
  - push

6- Flow control of data

R push

R pull

W ISO

R 7- Negotiation
  - memory allocation
  - data flow
  - other parameters

R 8- Packet Segmentation
R 9- Error Recovery
reconnect
timeout
Low priority items:
10- Compatibility with FCP/AVC
not a requirement to be FCP
11- Multilogin
multiple host
12- Multicast
host to multiple ports/devices

OSI(ish) Model for 1394PWG
APP
Session
Transport
peer to peer
full usage of memory bus model
Negotiable transfer sizes to maximize use of MTU (Maximum Transfer Unit)
Flow Control
Negotiation
Service Discovery
Datalink
CSR interface at device specific location
Flow control
CSR access negotiation
Transient Connection Disruption Tolerance
Node update - routing to transport
Transaction
Read-Write lock
Phy

III.B.2 Fumio Nagasaka -- Epson
SBP2 Printing Model

Minimal requirements for PC Printing protocol
Multiple Logical Channels
Flow Control
Multiple Hosts Connectivity
Multiple Targets Connectibility
Reconnection after bus reset

Multiplexing to support multiple clients for the transport.

Implementation of multiple logical channels through SBP2
How many logins does one printing session require
1-Build MLC internally within one login
2-Requires multiple login as same number of logical channel
3-Prioritize logins
Believe that #3, Prioritize logins, is the best solution
This will implement a Primary host login but allow for other hosts to login. Additional hosts will login as Secondary priority hosts.
Latest Epson proposal is available on the PWG website.

III.B.3 Akihiro Shimura - Canon
HPT High Performance Transport
HPT is a Command set layer on top of SBP2 that adds the functionality of

the required transport.
- Full duplex communication
  - Queuing model
  - Request based Flow Control
  - 3 command, 2 status
    - data transfer
    - read request, requested read
    - direct status, direct status response
- Primitive device control/status
  - 4 command, 3 status
    - Acquire, Release, Abdicate device response
    - Basic device status
- Logical Channel
  - 2 command, 2 status
    - Open, Close channel

HPT Objectives
- High performance with low overhead
- Bi-directional data transport
- Multiple service channels
- Application independence
- Backward compatibility with bus environment support
- Self configurable (like 1284.4 open channel), no prior setup required

Please review specification at ftp://ftp.tokyoweb.or.jp/pwgc1394/pub/proposals/canon/HPT03E.pdf and it is also available on the 1394 PWG web site.

III.B.4 Alan Berkema -- Hewlett-Packard

FCP or SBP2 versus Printing Protocol Requirements

SBP2
- Not true bi-directional communication
- Bi-directional extensions complicated and troubled
- ORB fetching considered "heavy protocol"

FCP
- No access control
- Fixed communication address
- Does not extend to multiple devices

Proposal DFA -- "Data FIFO Address Protocol"

Create an Inbound and Outbound Queue on each of the initiator and target
- Both sides push data into the peer's data fifo

Login and Login Response
- Provides access control
- Facilitates connection to multiple devices
- Allows simple reconnection
- Provides for unsolicited status

Limited Loginless status through query logins

Need data FIFO address exchange mechanism

Pros
- Borrowed from IP1394
- Sort of FCP like
- Bi-direction communication
- Efficient 1394 unified block write transactions
- simple, easy to explain
- command set independent
- easily add higher layer protocols

Logins do not add that much weight to FCP
Extensible to multiple devices

cons

Does not take advantage of 1394 shared memory
Do packets need additional header info
Does not address flow control

Could use this as a datalink layer for a 1284.4 transport client.

III.B.5 Review of requirements for Thick Transport Protocol stack (TP/DL/PHY)

Requirements:

1. Connection Oriented
   Open and close and connection to a service.
   A connection between two endpoints
   A service is above the transport.
   One connection cannot block another
2. Reliable
   Data is received correctly and in order of transmission
3. Byte steam and Buffer interface to the application
4. Service Discovery
   Provides directory of services available to the transport.
   Provides query support
5. Multiple Logical Channels
   Allows multiple and independent connections to a device or between different devices
6. Bi-directional data transfer
7. Peer to Peer
   Either end may open or close a connection
8. Application independent
9. Does not preclude concurrent operation of other protocol stacks
10. Transient link interruptions are transparent

Wants:

1. Connectionless support
2. Multi-casting
3. Bus Independent transport
4. Data Tagging (Out of Band)

Clarifications

Connections:

peer to peer (open/close/data) from either end
bi-directional
1:1 relationship between endpoints
Reliable

III.C Documents

- Sub-working group for FDS will meet on 9/17.
- See following comments from 9/17 meeting:

IV. How to bring closure and issue results

FDS proposal (PWG & PWG-C)
SBP-2 based printer definition (PWG)
FCP based printer definition (PWG-C)
IP/1394 based printer definition (TBD)

Discussion on above topics was raised by Greg LeClair. Don Wright

proposed that the discussion on requirements be formalized and each proposal submitter explain if requirements were met by their proposal.

Plan accepted and reflected below in Action items.

V. Action Items
1. FDS sub-group to meet on 9/17 and begin revising FDS doc.
   (Nakamura, Nagasaka, Murakami, Thrasher, LeClair)
2. Requirements doc to be published ASAP
   (Shue, Batchelder)
3. Comparison of Proposals to Requirements doc to be published at least 1 week prior to Boulder meeting for consideration by WG. Comparison and updated proposals should be sent to Greg LeClair for posting by 10/20.
   (All proposal submitters)

Sub-working group meeting on FDS - 9/17.

Goal of meeting today:
Put document into public hands
- Items in questions that need addressing:
  - Key value 18h - ConfigROM dynamic nature????
  - Establish rule of usage - boundary conditions
  - Configuration_state change -> Configuration register
    - forcing it to Random number may preclude use by a vendor as a '1 of n' configuration value
    - Consider allocating space and recommending usage.
      - Exact value is vendor dependent.

Nagasaka asked question if we really need FDS as it is defined
- Reason: existing mechanism - re-read ConfigROM
- GL this is non-deterministic,
  - Configuration change identifier tells us if ROM is changed
- Global point of view
  - Config_Identifier is just for FDS or global for ConfigROM

Document Action Items:

Title suggestions
Terminology:
Greg will draft explanation for forward.
- Big picture List of function and Unit identifier
Greg will send Ats a list of terminology changes
- i.e. we used this - now should be this

Rewrite document to utilize same terminology as IEEE-1212
- Possibly add new terminology to identify new items (FUNCTION)
- Change Annex A to informative

Point out contentious issues in the Overview
- Issues TBD
- Past discussion history
  - Issues addressed & resolution (Like SBP-2 spec)

Current issues:
- scope of configuration identifier (just FDS or entire config ROM)
  - Scope is just FDS or entire Config ROM
  - break value into fields to identify what has changed.
  - Possibly other method, needs investigation.

- Function Class categorization
    - How is it represented - pair of FUNCTION & UNIT IDENTIFIER
    - Central RAC for all "FUNCTION CLASSES" (IEEE RAC? others)
    - Value for UNIT IDENTIFIER
    - Pointer to Unit directory or
    - same as (which Key?) in the Unit directory to identify the "I/O driver software"

- Annex A - Function Unit Info field
    - Usage is TBD
    - 1394 PWG is discussing content such as legacy PNP string.
    - Feedback appreciated
    - Will be made informative at this time.

Nagasaka raised issue of power management for multi-function unit
- Requires further discussion, decided it did not directly affect FDS and further discussion was postponed.

Meeting closed.

Submitted by:
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and
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