

Agenda

P1394b Editorial Working Group (Draft Specification Page Turner) September 16th & 17th 1999

Beginning of Meeting SCAT COUNTDOWN: 6 - OPEN; 10 - WIP; 10 - AIP; 61 total database entries.

End of Meeting: SCAT COUNTDOWN: 3 - OPEN; 7 - WIP; 8 - AIP; 61 total database entries.

Those in attendance: David Wooten (Compaq), Victoria Teng (NEC), Jerry Hauck (Zayante), Michael Teener (Zayante), Steve Bard (Intel), Colin Whitby-Strevens (Zayante)

Action Items from the previous meeting:

#1) David Wooten will make certain the copperhead connector drawings are compliant to the appropriate industrial design standards.

#2) Eric Hannah has an Intel colleague that will assist him in resolving a good number for differential transmit skew at S1600. The current spec. calls for 12 pico-seconds - David Wooten believes he may be able to hold 25 pico-seconds but not 12.

#3) Sean Killeen: Is there a timing issue with ARB_RESET_GAP and SUBACTION_GAP serial interrupt notification? PIL is receiving PHY_SOLICITED register contents and a subaction or arb gap occurs, which cannot be reported immediately because FOP_INT is BUSY. There seems to be a timing issue here that must be resolved - OR an opportunity for Sean to explain why everything is okay! This was entered into the SCAT issue data base as issue #60.

Action Items assigned at this meeting:

#1) Steve Bard has an AR to add text to clause 11.51 standby state transitions

#2) Mike Teener will write informative text for section 3.3 that will explain where in the draft each of the boxes in figure 3.1 is specified.

#3) An Action Item to the Editor: Change all occurrences of lower case "l" in "Legacy" to an upper case "L" (like in clause 4.2.2)

#4) Colin to develop a proposal for definitions of the terms outlined in the table included below.

#5) Steve Bard will deliver a list of all folks who have attended any P1394b meeting to David. - Done

Technical Glossary Review:

Page 44, Clause 2.2.183 might want to correct the definition for "to" or get a new keyword. For now, this will be deleted. Eric will queried as to what his intent was here.

Legacy: - 1394 characteristic or behavior defined by the IEEE 1394-1995 Standard and its supplements previous to this supplement

Legacy mode will be removed; Legacy request will be moved to

packet delimiter: a sequence of control symbols which delineate the beginning and ending of the data packet

padding: control symbols that are interleaved with data characters to allow lower speed data to be transmitted on higher speed connection

request type: an 8B10B data symbol which connotes either an arbitration or configuration request

hybrid bus: a bus which contains at least one PHY operating as a Border node.

border node: a node with at least one active port operating in beta mode and at least one of the following: 1) an active Legacy link; 2) an active port operating in DS mode

border mode: an operational state of a PHY that has at least one port operating in DS mode and at least one port operating in Beta mode where the Link interface is considered a port.

Colin suggested we use the following table to get a grasp on the terms that must be defined:

CAPABILITIES		CURRENT OPERATION MODES	
BETA Only PHY BETA Only Node Border Node Legacy Node	PHY	Beta Only Mode Hybrid Mode	BUS
DS-ONLY Bilingual Beta-Only	PORT	Border Beta-Only Legacy	PHY
		DS Beta	PORT
B Legacy	LINK	Beta-Serial B-Parallel Legacy	LINK

DS Port: (a) a port capable of DS operation only; (b) a port operating in 1394 DS mode

Border Node has both: (a) at least one Beta port or B-Link; (b) at least one DS port or Legacy link

After much bantering back and forth as to what should be defined how, David assigned to Colin an Action Item to develop a proposal for definitions of the terms in red in the table above.

Mike Teener brought up the content of Clause 16... Regarding the "New" Clause 16... This clause will be removed and the information will be placed into clause 14.4.1 There is a table in 1394-1995 (Table 6-4) that will be copied into 14.4.1 and updated to add 1394b speeds.

Mike Teener added a "place-holder" section for the IEEE required "Reference Clause" - this will have the "magic" result of "renaming" all of the frame-maker files (since all of the section numbers will change, the file "section2" will actually have "Section 3" content if the file names are not changed <Secretary Comment to Editor: Eric... You should have been here!>

Table 3-1 in clause 3.3 is not very intuitive and words should be added to explain what this table is endeavoring to communicate. In addition, line "18" ("This specification avoids the use of the word 'node' when possible as an imprecise term") shall be deleted.

LUNCH BREAK (with Roger Van Brunt) - During lunch, a lengthy discussion of isolation circuits for the various isolation needs for 1394b with Roger resulted in agreement that the isolation circuits David Wooten sent out for review are in good shape (e.g. they will work). Roger is the original analog designer of the first 1394 PHY.

Continuing with Clause 3.3 (the subject just prior to lunch):

Colin suggested an alternate table for clause 3.3:

Link/Port Type PHY Type	Legacy Link	1394b Parallel Link	1394b Serial Link	DS Ports	Bilingual Ports	Beta-Only Ports
Legacy	✓			✓		
Border	✓	✓	✓	✓	✓	✓
Beta Only		✓	✓			✓

✓ Means "This type of PHY may support this type of Link or port"

"There are three capabilities defined for PHY ports: Beta only, DS Only or bilingual. A beta only capable port may only operate in Beta mode, a DS only capable port may only operate in DS mode, and a bi-lingual capable port may operate in either Beta or DS mode.

A PHY's capabilities are determined by its port capabilities. If a PHY only has Beta only capable ports then the PHY is BOSS only and can only operate in BOSS mode. A PHY that only has DS capable ports may only operate in Legacy mode.

Group consensus is that table 3-1 in Clause 3.3 shall be removed as well as the text before and after and shall be replaced with text/table that provides more clear information.

Steve Bard has an Action Item to reduce the words of his "Standby" white-paper into a brief rationale/summary and submit them for inclusion in Clause 3.

Colin Whitby-Strevens has an Action Item to incorporate descriptive text of "Standby" into clause 11.

David Wooten accepted an Action Item to develop some descriptive/rationale text for the PIL/FOP model and submit them for inclusion in clause 3.6.

All action items that involve the addition of text into the 0.87 draft must be submitted to Mike Teener before end of business on Friday, September 24th.

The 0.90 draft will be published on October 7th, therefore, all submissions must be received by Eric Hannah before the end of business on October 6th.

It was noted that a vote was taken in the April Plenary to accept the PIL/FOP model (29 in favor, 0 opposed, 3 abstentions).

Things kind of slowed down in discussions around 4:00 PM. There was a number of side-bar conversations and a number of "changes" were agreed to in the draft standard - none of which was discussed sufficiently so that sense could be made of it so that the changes could be cited here in the minutes of the meeting. The most significant changes of note were the title change for clause 6 (PHY Test Modes) and the elimination of 6.1, 6.2 and 6.3 after a review of SCAT entry #27. The new title is "Jitter Measurement Techniques".

David provided Mike with an updated set of capacitor values for isolation circuits.

Colin reviewed the POF chapter and made various and sundry editorial, grammatical and spelling corrections.

Dismissal occurred around 6:00 PM for continued discussion over dinner.

Reconvene approximately 9:00 AM on Friday... Those present: Steve Bard (Intel), Jerry Hauck (Zayante), Colin Whitby-Strevens (Zayante), Victoria Teng (NEC), Mike Teener (Zayante), Sean Kileen, and David Wooten (Compaq).

Discussion started with SCAT issue item number 61 (Delete-able Symbols)..For the sake of completeness, what follows is a copy of the status history for this SCAT issue: " 8/23/99: 1) Evaluate the behavior of the current specification when using two delete-able symbols at a single speed (a slower speed and a faster speed); 2) Validate behavior of the may/must algorithm and investigate how to architect it; 3) Work through the results of item 1 and 2 - validate all combinations of link and packet speeds"

When a symbol has been placed into the FIFO, it must remain there for 20 nanoseconds before it may be repeated out of the FIFO. The required time delay is likely to come for free because of the delays incurred in the implementation of the FIFO synchronizer. The draft will state the requirement for a 20 nanosecond delay from the time data first arrives in the FIFO to the time it is repeated out of the FIFO. Two constants will be called out in the spec - both with a nominal time of 17 nanoseconds. The first, DELAYED_SYMBOL_TIME identifies the amount of time an originating PHY must transmit delete-able symbols one every part at the start of a packet. The second, FIFO_WATERMARK_TIME identifies FIFO depth (either in terms of the number of bytes or the amount of time since the FIFO first received data) before the data in the FIFO is repeated out of the FIFO.

Victoria suggested the use of more tables and charts to better explain the PIL/FOP interface. Sean took an action item to better document the PIL/FOP interface for the 0.90 draft.

Victoria also pointed out that the details describing the FOP side band signals are not very clear that though FOP_INT and FOP_REQ correspond to PHY interrupt and LReq, it is not clear how these signals will operate. A table should be added to make FOP_REQ and FOP_INT more

clear. It was agreed that this would be a good thing to do, however, further discussion of this was postponed until the group could decide whether the USB signals would be eliminated or not.

Victoria suggested that 12.10.1 "Operating Model" have a detailed drawing and description of the PIL/FOP interface. Everybody agreed that a PIL/FOP drawing would be good.

Much discussion about removing the Unified Side Band signals (USB) using a new proposal from Jerry that uses a "Point-to-Point Packet" (PTPP). Jerry's proposal is:

The serial PHY/Link interface proposed for P1394b currently includes:

TPA +/-

TPB +/-

USB +/-

LinkOn

The protocol of the full-duplex link afforded by the TPA/TPB pair provides the equivalent of packet data transfer, bus arbitration requests, bus reset and gap status indications, receive clock (SCLK), and link power status (LPS).

The LinkOn signal retains it's traditional role of providing an out of bound interrupt indication to system logic (outside of the link, for example) .

The Unified Side Band signal (USB) provides out of band signaling for the remaining service needs: PHY register read and write requests, and interrupt notification (directly to the link rather than through LinkOn) of port events, loops, power failures, etc.

USB can be removed with the definition of a point-to-point packet (PTPP) format. Transmission of the packet is occurs only between peer ports and does not require arbitration. As a consequence, the packet format is defined such that the packet can be interrupted by arbitrated packets, gap indications, etc. The transmission of such a packet across a link has no effect on the most recently transmitted arbitration request on the same link. (If an isoch request was sent prior to transmission of the PTPP, the isoch request would still be registered and in effect at the conclusion of the PTPP.)

*A PTPP is delimited at the beginning by a special control symbol (Sx) and a disparity correcting data prefix. The ending delimiter is a double dose of data end. The payload format of the PTPP is extremely flexible. A different payload format can be invoked between different peer ports, for example. Finally, PPTP are never padded ... they are sent at the operating speed of the peer ports. A PPTP then looks like:
Sx DP [Payload Symbols] DE DE*

If a port needs to interrupt transmission of a PTPP for any reason (arriving arbitrated packet or control symbol needs to be repeated, for example), it can terminate transmission of the PPTP early. For example, a received packet interrupting a PPTP would look like:

Sx DP [partial payload] Sc DP [Arbitrated packet payload] DE DE

Note: may need to think about the impact of interrupting a PPTP with a single control symbol. This violates our guiding principle that 8b/10b data is always delimited by 2 control symbols. Either we relax that restriction for point to point communications, or we may observe that control tokens in the free and clear are

either sent for 80 ns or can be delayed without impact (GRANT). So a port sending a PPTP which is requested to send a control token could wrap up with 2 control tokens without any harm, provided the port speeds is S200 or faster.

As a final note, Sx doesn't necessarily need to be a new control symbol. Sa may perform the job nicely since, to date, no packet format can have a speed code which consists entirely of Sa.

Having defined this interrupted packet type, it can be put to good use in removing the USB signal. For link requests to read or write a PHY register, the payload could be defined as: the first 4 bits represent the command type of which only two are currently defined, Register Read Request and Register Write request. For both register read and write requests, the next 4 bits provide the PHY address. For the register write request, a final 8 bits of data are defined for the register value. The reserved command types could be extended in the future to allow direct addressability of per port registers and PHY pages.

For PHY to Link transfers, the payload format needs to return read data, solicited/unsolicited indicator, and an interrupt flag. Borrowing from the current PINT definition seems appropriate ... the first 4 bits are the status type which start out with three defined types: PHY_REGISTER_SOL, PHY_REGISTER_UNSol, and PHY_INTERRUPT. For the register types, the next 12 bits provide the address and data. Again, extended types can be defined which would, for example, return the interrupt vector.

As a final consideration, the ability to deliver an uninterrupted PPTP within a bounded time should be considered. While the link can control it's own transmission and thus it's ability to successfully send a PPTP to the PHY, the PHY has less control over the rate and frequency of arriving packets being delivered to the link (and therefore preventing successful PPTP transfers). A preferred technique for dealing with this is to require that the largest PPTP sent to the link be shorter, in time, than a legacy DATA_END period by at least two port symbol times. If this requirement is maintained, then the PHY knows that as it repeats the end of a legacy packet to the link, it can safely replace all DE symbols after the first two with a PPTP. For a worst case PPTP payload of 2 bytes, a legacy packet plus PPTP being sent across an S400 connection to the link would look like:

[Legacy Payload] DE DE Sx DP B1 B2 DE DE DE DE DE

By the above, a PPTP is guaranteed to be transferred at the end of each legacy packet. To guarantee register transfers within a bounded time, we only then need to guarantee legacy packets within a bound period. Cycle starts are likely to provide a legacy packet every 125 us. I would propose that if a PHY with a serial PHY/Link interface hasn't seen a legacy format packet within ~130 us, it can arbitrate for the bus and send a legacy null packet. (The 130 is arbitrary and should be some easy to count size, but would ideally be larger than 125 us so that we allow cycle starts to do the dirty work.)

Note that the register 0 transfer during self-id is not an issue ... self-ID are required to be sent with legacy format.

Also note that the same technique can be used for non-legacy format packets. The essential observation is that a PHY, after repeating 2 DE's of a packet, can simply attempt transmission of a PPTP. If it is interrupted, so be it. To then guarantee that a PPTP will be delivered in some bounded time, the PHY needs to make sure a packet is sourced on the bus with some frequency who's DE duration is larger than the max number of symbols in a PPTP plus 2.

USB will be deleted and the PTPP format will be PTPP²-D²DE²

The value for the PTPP symbol is 1101_b.

SCAT Item 48 has been changed to Agreed In Principle and Jerry has an action item to deliver to Colin the first pass draft text. Colin will integrate the text into the appropriate clause of the draft.

Steve Left at 4:40 PM