

Reduced Twisted Pair Gigabit Ethernet Study Group

Chair: Steve Carlson

Recording Secretary: Mandeep Chadha

Thursday, September 27, 2012

- 9:05 AM Meeting called to order
- 9:05 AM Introductions by all attendees, sign in sheets distributed to record who is at the meeting
- 9:10 AM Motion to approve agenda
 - M: George Zimmerman, S: Dave Dwelley
 - Motion passes by voice vote
- 9:12 AM Motion to approve minutes from July plenary
 - M: Mike Bennett, S: Mehmet Tazebay
 - Motion passes by voice vote
- 9:13AM Chair reviewed general information about the meeting
 - Press
 - No press present in room
 - Meeting goals
 - Ground rules
 - Electronic information
 - IEEE structure
 - Important bylaws
 - Guidelines for IEEE-SA meetings
 - Overview of 802.3 process
 - Action items
 - Attendance
- 9:33AM Report on survey conducted by Channel Definitions Ad-hoc in August to collect auto industry requirements (presented by Chris Diminico)
 - Reviewed issues that were encountered when survey was started, legal review.
 - Question from floor on whether any learnings can be shared with the group as well as other groups within IEEE to make this go more smoothly in the future

- Add cover letter provided by legal team to each survey
 - Suggestion to contact IEEE 802 chair to review before distributing survey
- Reviewed purpose of survey
- Reviewed survey document that was sent out with the added cover letter
- Request survey respondents that had already sent in their responses to resend them with the cover letter
- Question from floor on significance of colored boxes in table 3 of the survey
 - Red boxes highlight the data that is specified today as part of channel definition
 - Needs offline audit to cover missing parameters that should also be highlighted
- 9:57AM Report from power (PoDL) adhoc (Presented by Dave Dwelley)
 - Set up a separate group to create specification, working on CFI, target March 2013 plenary
- 10:03AM Review PAR submission form online
 - Discussion on title
 - Question from floor about specifying target markets in project title
 - PAR title only survives while project is active, we can change actual clause title
 - Concern with excluding certain valid application areas for this technology by only specifying a few areas in the title
 - Change title to specify “fewer than three pairs” instead of application areas
 - Suggestion to live with what we have and then submit a PAR modification to change the title once we decide the exact numbers of wire pairs that this technology will operate on
 - Schedule
 - Draft submission for initial sponsor ballot – September 2013
 - Project completion for submittal to REVCOM – May 2014
 - PAR is valid for 5 years, these dates are guidelines for the group
 - Fastest possible timeline, very aggressive schedule
 - Section 5 – Need
 - Environmental impact of this program
 - Reduction of copper
 - Carbon footprint reduction
 - Section 8 – Additional Explanatory Notes

- No change as it is answering the question
- 10:44 AM Motion to adopt PAR
 - M: Don Pannell, S: Brad Booth
 - Technical motion (>75%)
 - Y: 50 N: 0 A: 1
 - Motion passes
- 10:46 AM Break for coffee
- 11:11 AM Meeting reconvenes
- 11:15 AM Review 5 Criteria
 - Broad Market Potential
 - Industrial Automation – 100 million Ethernet nodes
 - Modified “Multiple vendors and applications” bullet with feedback from group
 - Distinct Identity
 - No changes
 - Technical Feasibility
 - No changes
 - Economic Feasibility
 - No changes
 - Motion to adopt modified 5 Criteria
 - M: Mike Bennett, S: Jeff Heath
 - Technical motion (>75%)
 - Y: 37 N: 0 A: 3
 - Motion passes
- 11:23 AM Presentation on Noise considerations for RTPGE by Gavin Parnaby
 - Clarification from chair that we will be making many decisions as part of this project and not every decision is in response to an objective
 - Keep objectives simple and set up ad-hocs during TF to address specific concerns
 - The task force can refine and modify objectives
 - Models from PowerLine analysis may be applicable to the RTPGE work
 - Thomas Hogenmueller to bring in a presentation addressing the noise environment that is based on a Ph.D. thesis work at Bosch.
 - Requirements highlighted in the presentation should be taken into account when doing

channel analysis

- Define objectives that can be measured, topics addressed in the presentation are requirements but not necessarily objectives for the project
- 11:55 AM Break for lunch, back at 1:30 PM
- 1:40 PM Meeting reconvenes
- 1:40 PM Presentation on Objectives by Mehmet Tazebay
 - Proposed two objectives to cover channel reach
 - Discussion on what is “longer reach” in second objective
 - 15m channel for automotive is not defined yet either
 - Proposed that the first objective be worked on to refine further and adopt
 - Develop consensus on longer reach objective and adopt later
 - There is opposition to adopt just one 15m reach objective without also adopting the longer reach objective
 - Example cited of 10BASE-T where the specification was done for 100m of CAT-3 cable and the reach is 180m over CAT-5 cable. The additional reach came for free with a better channel definition.
 - Motion to adopt the two objectives as stated on page 4 of tazebay_01a_0912.pdf
 - M: George Zimmerman, S: Wael Diab
 - Discussion
 - Motion to divide the two objectives for separate consideration
 - M: Geoff Thompson
 - No second
 - Motion to divide fails
 - Motion to postpone vote until 4:00PM
 - M: Brad Booth, S: Don Pannell
 - Y: 37 N: 0 A: 10
 - Motion passes
- 2:32 PM Presentation on RTPGE Technical Feasibility by Richard Mei
 - Discussion
 - “Existing automotive cable” in presentation implies jacketed FlexRay cable
 - Balance property is measured on connector only while previous channel characteristics were measured on the cabling system as a whole

- Automotive FlexRay connector
 - Emissions from the two test cables measured in lab, presented by Dance Wu
 - Summary slide, bullet #4 states that “transceiver meets EM mask with margin” but graph was presented without any EM mask specification
 - Clarification from presenter that this data should be treated as an A/B comparison
 - Clarification on wire diameter of CoomScope cable – 0.59 mm
 - Limit line on graphs is not from any standard, it was based on a requirement from a specific OEM
 - Both cables were built for 100 ohms impedance
 - FlexRay cable was pre-terminated using the standard manufacturing process
- 2:54 PM Presentation on EMC measurements for automotive environments by Michael Jones
 - Discussion
 - No proposal to use the same measurement technique for RTPGE
 - This testing is not to replace system level testing, just a quick pre-indicator
- 3:14 PM Presentation on Passing Automotive EMC with standard IEEE PHYs by Don Pannell
 - Discussion
 - PHY as presented is not IEEE standard compliant, does not meet transmit mask
 - Capacitive coupling not the same as cable filtering
 - Shown to be equivalent by interop testing up to 100m between two PHYs that implement capacitive filtering
- 3:55 PM Break for coffee
- 4:12 PM Meeting reconvenes
- 4:12 PM Motion to adopt the modified objectives as stated on page 6 of tazebay_01a_0912.pdf
 - Friendly amendment to original text from page 4 of the presentation used to create objectives on page 6
 - M: George Zimmerman, S: Wael Diab
 - Friendly amendment proposed by Don Pannell to make bullet 3 a sub-bullet of bullet #1
 - Change not accepted as friendly amendment

- Motion to adopt the amended objectives on page 7 of tazeбай_01a_0912.pdf
 - M: Don Pannell, S: Gavin Parnaby
 - Y: 20, N: 20, A: 7
 - Motion fails
 - Original motion called to question to adopt objectives as stated on page 6 of tazeбай_01a_0912.pdf
 - Objection to calling the question
 - Y: 27, N: 11, A: 9
 - Objection passes, original motion not being voted on at this stage
- Vote on motion to accept text as written in page 4 of tazeбай_01a_0912.pdf
 - M: George Zimmerman, S: Wael Diab
 - Y: 29 N: 12 A: 8
 - Motion fails
- Motion to adopt the objectives as stated on page 7 of tazeбай_01a_0912.pdf
 - M: Wael Diab, S: Kirsten Matheus
 - Discussion on motion, modifications to text were rejected
 - Called the question
 - Objection called by Hugh Barrass to calling the question
 - Y: 29, N: 2, A: 1
 - Postponed voting on above motion
- Motion to adopt the single objective as stated on slide 8 of tazeбай_01a_0912.pdf
 - Called for a roll call vote
 - M: Wael Diab, S: Kirsten Matheus
 - Y: 39 N: 2 A: 9 DNV: 3
 - Motion passes
- Discussion
 - Removing line related to single PHY in distinct identity would cause issues at working group ballot
 - Tying each PHY to a specific media type would be OK
- 5:15 PM Motion #11 in RTPGE_Motions_0912.pdf
 - M: Franz Goetz S: Yair Darshan
 - Technical (>75%)

- Y: 34 N: 2 A: 10
 - Motion passes
- 5:30 PM Straw polls #1 - #4 in RTPGE_StrawPolls_0912.pdf
- 6:00 PM Meeting adjourned

Friday, September 28, 2012

- 9:15 AM Meeting called to order
- 9:16 AM Thomas HogenMueller requested permission to bring in an additional objective for the project
 - Comment from floor that we need a presentation to substantiate this number
 - Support for having a number (100ms) in the spec, additional study required
 - Prefer optional, difficult goal to achieve
 - Optional if we adopt auto-negotiation and number is valid if auto-negotiation is bypassed
 - Clarification if only PHY has to be up in 100ms or does the system need to be up in this time
 - General support for such an objective but it needs some more work
 - 802.3 state diagrams use “power on”, use the same condition in this specification
 - Should put in this objective even though it is tough to hit, change objective if we later determine that it cannot be hit for technical reasons
 - Startup can be aided with stored criteria in car electronics
 - Better define what “power on” means – is it power applied to system or when system declares a “power good” state
 - Allow time for PoDL
 - Motion #11 introduced to adopt this objective
 - M:Kirsten Matheus S: Brad Booth
 - Technical (>75%)
 - Y: 46 N: 0 A: 0
 - Motion passes
- 9:56 AM Motion #12
 - Removing this objective focuses the attention of the group
 - Does not prevent someone from using the PHY as defined for the target application is other applications including data centers
 - M: Brad Booth S: Geoff Thompson
 - Technical (>75%)
 - Y: 40 N: 0 A: 4
 - Motion passes

- 10:03 AM Review all project material that has been prepared for submissions
 - PAR, 5C & Objectives can be changed along the way
 - Steve reviewed process that we will go through at the Nov plenary and get approval to move to next step
 - Task force will formally come into existence after EC approval in December. First task force meeting will be in January
 - Between now and January, the group should focus on getting data ready for all areas that were being discussed
 - We can still have presentations at the Nov plenary but we cannot make any decisions or adopt any proposals at that time
- 10:15 AM Break for coffee
- 10:38 AM Meeting reconvenes
- 10:38 AM Review PAR
 - Discussion
 - Suggestion to include intention to modify the PAR in “Additional comments”.
 - Not necessary as PAR modification is allowed and is part of the process.
 - No changes to PAR document
- 10:51 AM Review 5C
 - Discussion
 - Concern with strong statement that technology is no more complex than a 1000BASE-T PHY
 - Higher noise but shorter channel
 - Shorter channel significantly reduces complexity due to shorter cancellers
 - Presentation on 9/27 showed this technology may be complex due to noise considerations
 - Intention of first bullet was to differentiate this technology from 10GBASE-T.
 - Motion #13 to strike bullet #1 and modify bullet #3
 - M: Brad Booth S: Geoff Thompson
 - Technical (>75%)
 - Y: 40 N: 0 A: 4

- Motion passes
 - Discussion
 - What is scope of “broad knowledge base of Ethernet network operation”
 - Intention was to draw on the whole knowledge base of 802.3
 - Motion #14 to modify bullet #3 in 5C, Economic Feasibility response
 - M: Brad Booth S: Mike Bennett
 - Technical (>75%)
 - Y: 20 N: 0 A: 22
 - Motion passes
- 11:35 AM Review objectives
 - Discussion
 - Concern that a channel is being defined without defining a PHY that operates over that channel
 - 10BASE-T defined channel parameters for a link segment
 - 802.3 defines PHYs that operate over media that is defined elsewhere. This project is different from what is usually done by 802.3. For this project, the link segment specification is not there.
 - Intention is to define a PHY for 15m and then define a better channel that the previous PHY can operate on and can achieve 40m+ of reach
 - Intention is not clearly stated and will cause confusion in 802.3
 - 10GBASE-T had a specification for operation over different cable types of different lengths.
 - Motion #
- 12:59 PM Break for lunch
- 2:15 PM Meeting reconvenes, chair reviews goals for the afternoon
- 2:20 PM Conduct straw polls #5 - #9 on modifications to objectives to gauge which way the room is leaning.
 - Straw poll #5
 - Replace “Define” in the second major bullet of Objectives on slide #2 with “Investigate”
 - Y: 14 N: 11 A: 9
 - Straw poll #6

- Add after “Define” in the second major bullet of Objectives on slide #2 the word “optional”
 - Y: 29 N: 2 A: 7
 - Straw poll #7
 - Add after “Define” the word “optional ” and add after “channels(s)” the words “the 15m PHY”
 - Y: 18 N: 2 A: 16
 - Straw poll #8
 - Add after “Define” the word “optional ” and add after “channels(s)” the words “the 15m PHY”. Also, replace “Define” with “Investigate”.
 - Y: 14 N: 9 A: 12
 - Straw poll #9
 - Delete bullet #3 that sets an objective to define a channel for 40m.
 - Y: 6 N: 21 A: 9
- 2:45 PM Conducted straw poll #10 to modify the objectives under consideration as indicated on slide titled “Objectives (Straw Poll #10)”
 - Y: 18 N: 7 A: 8
- 2:50 PM Conducted straw poll #11 to modify the objectives under consideration as indicated on slide titled “Objectives (Straw Poll #11)”
 - Y: 18 N: 14 A: 4
- 2:55 PM Conducted straw poll #12 to modify 2nd major bullet of the objectives under consideration as indicated on slide titled “Objectives (Straw Poll #12)”
 - Y: 21 N: 0 A: 14
- 3:00 PM Motion #15
 - Discussion
 - Amendment offered to add language that clarifies environment for 40m industrial channel
 - Amendment not accepted by mover
 - Motion #16
 - Motion called to amend motion #15 as indicated on slide titled “Objectives (Modified by Motion #15 and Motion #16)
 - M: George Zimmerman S: Stefan Buntz

- Y: 20 N: 9 A: 7
 - Motion fails
 - M: Don Pannell S: Yair Darshan
 - Y: 27 N: 1 A: 10
 - Motion passes
- 3:20 PM Motion #17
 - Discussion
 - Suggestion made that study group should create a tutorial for 802.3 to explain what this study group is trying to do since there are more unknowns for this project than is usually the case
 - M: Brad Booth S: Hugh Barrass
 - Y: 24 N: 1 A: 11
 - Motion passes
- 3:25 PM Motion #18
 - M: Kristen Matheus S: Stefan Buntz
 - Y: 35 N: 1 A: 0
 - Motion passes
- 3:30 PM Review updated objectives
 - Brought up that the task force will not define the link segment, which includes, connector, cables, etc. but rather the performance characteristics of the link segment. Reconsider objectives to state this correctly.
- 3:35 PM Motion #19 – reconsider changes made by motion #17 that replaced channel by link segment
 - M: George Zimmerman S: Mehmet Tazebay
 - Y: 23 N: 4 A: 5
 - Motion passes
- 3:40 PM Motion #20
 - Discussion
 - Channel essentially same as link segment for cabling industry. ISO uses channel whereas IEEE uses link segment for essentially the same thing. However, we should keep terminology consistent with IEEE.
 - Motion #21

- Motion to amend Motion #20 and add the text “the performance characteristics of” after “Define” of bullets #1 & #2
 - M: Hugh Barrass S: Don Pannell
 - Y: 30 N: 1 A: 2
 - Motion passes
- All the nested changes have gotten very confusing and the group decided to table motion #20 and introduce a motion to adopt the text for the objectives in its final form.
- Motion #22 – Move to table motion #20
 - M: George Zimmerman S: Don Pannell
 - Motion passes by voice vote
- 3:55 PM Motion #23 – move to adopt text on slide #7 of Objectives_1_0912.pdf
 - M: Hugh Barrass S: Don Pannell
 - Y: 29 N: 0 A: 4
 - Motion passes
- 4:00 PM Motion #24
 - M: Mike Bennett S: Gavin Parnaby
 - Y: 31 N: 0 A: 0
 - Motion passes
- 4:02 PM Discussion of next steps
 - Set up EMC adhoc
 - Stefen Buntz and Mehmet Tazebay appointed co-chairs of this adhoc
- 4:03 PM Call for any other business - none
- 4:04 PM Meeting adjourned

Objectives

27-Sept--2012

- **Preserve the IEEE 802.3/Ethernet frame format at the MAC client service interface.**
- **Preserve minimum and maximum frame size of the current IEEE 802.3 standard.**
- **Support full duplex operation only.**
- **Support a speed of 1 Gb/s at the MAC/PLS service interface.**
- **Maintain a bit error ratio (BER) of less than or equal to 10^{-10} at the MAC/PLS service interface**
- **Support 1 Gb/s operation in automotive & industrial environments (e.g. EMC, temperature).**
- **Define optional Energy-Efficient Ethernet**

Objectives

27-Sept-2012

- **Define a PHY to support point-to-point operation over a link segment with less than three twisted pairs supporting up to four inline connectors using balanced copper cabling for at least 15m for the automotive channel.**
- ☐ **Define an automotive channel**
- **Define channel(s) with a reach of at least 40m for industrial controls and/or automation, transportation (aircraft, railway, bus and heavy trucks) applications**
- **Define optional startup procedure which enables the time from power_on=FALSE to valid data to be less than 100ms**

Objectives

(Modified by Motion #15)

- Define a PHY to support point-to-point operation over a link segment with less than three twisted pairs supporting up to four inline connectors using balanced copper cabling for at least 15m for the automotive channel.
- ☐ Define an automotive channel
- Define optional channel(s) for the above PHY for industrial controls and/or automation, transportation (aircraft, railway, bus and heavy trucks) applications with a goal of at least 40m reach
- Define optional startup procedure which enables the time from power_on=FALSE to valid data to be less than 100ms

Objectives

(Modified by Motion #15 & Motion #16)

- Define optional channel(s) for the above PHY for industrial controls and/or automation, transportation (aircraft, railway, bus and heavy trucks) applications with a goal of at least 40m reach
 - Such channel(s) may require higher performance cabling and connectors than the automotive channel
 - Such channel(s) may have less stringent EMC requirements than the automotive channel

Objectives

(Modified by Motion #17)

- Define a PHY to support point-to-point operation over a link segment with less than three twisted pairs supporting up to four inline connectors using balanced copper cabling for at least 15m for the automotive **link segment**.
- ☐ Define an automotive **link segment**
- Define optional **link segment(s)** for the above PHY for industrial controls and/or automation, transportation (aircraft, railway, bus and heavy trucks) applications with a goal of at least 40m reach
- Define optional startup procedure which enables the time from power_on=FALSE to valid data to be less than 100ms

Objectives

(Modified by Motion #18)

- Define **an automotive link segment** and a PHY to support point-to-point operation over **this** link segment with less than three twisted pairs supporting up to four inline connectors using balanced copper cabling for at least 15m for the automotive link segment.
- Define optional link segment(s) for the above PHY for industrial controls and/or automation, transportation (aircraft, railway, bus and heavy trucks) applications with a goal of at least 40m reach
- Define optional startup procedure which enables the time from power_on=FALSE to valid data to be less than 100ms

Objectives

(Modified by Motion #20)

- Define **the performance characteristics of** an automotive **link segment** and a PHY to support point-to-point operation over this **link segment** with less than three twisted pairs supporting up to four inline connectors using balanced copper cabling for at least 15m for the automotive **link segment**.
- Define **the performance characteristics of** optional **link segment(s)** for the above PHY for industrial controls and/or automation, transportation (aircraft, railway, bus and heavy trucks) applications with a goal of at least 40m reach
- Define optional startup procedure which enables the time from power_on=FALSE to valid data to be less than 100ms

Objectives

(Modified by Motion #21)

- Define **the performance characteristics of** an automotive link segment and a PHY to support point-to-point operation over this link segment with less than three twisted pairs supporting up to four inline connectors using balanced copper cabling for at least 15m for the automotive link segment.
- Define **the performance characteristics of** optional link segment(s) for the above PHY for industrial controls and/or automation, transportation (aircraft, railway, bus and heavy trucks) applications with a goal of at least 40m reach
- Define optional startup procedure which enables the time from power_on=FALSE to valid data to be less than 100ms

Objectives (Original)

- **Define a PHY to support point-to-point operation over a link segment with less than three twisted pairs supporting up to four inline connectors using balanced copper cabling for at least 15m for the automotive channel.**
- ☐ **Define an automotive channel**
- **Define channel(s) with a reach of at least 40m for industrial controls and/or automation, transportation (aircraft, railway, bus and heavy trucks) applications**

Objectives (Straw Poll #10)

- **Define a PHY to support point-to-point operation over a link segment with less than three twisted pairs supporting up to four inline connectors using balanced copper cabling for at least 15m for the automotive channel.**
- ☐ **Define an automotive channel**
- **Define optional channel(s) for the above PHY for industrial controls and/or automation, transportation (aircraft, railway, bus and heavy trucks) applications**

Objectives (Straw Poll #11)

- **Define a PHY to support point-to-point operation over a link segment with less than three twisted pairs supporting up to four inline connectors using balanced copper cabling for at least 15m for the automotive channel.**
- ☐ **Define an automotive channel**
- **Investigate channel(s) for the above PHY for industrial controls and/or automation, transportation (aircraft, railway, bus and heavy trucks) applications**

Objectives (Straw Poll #12)

- **Define optional channel(s) for the above PHY for industrial controls and/or automation, transportation (aircraft, railway, bus and heavy trucks) applications with a goal of at least 40m reach**

Name	Vote			
	Y	N	A	DNV
Mandeep Chadha	1			
Thomas Suermann	1			
Nicolas Morand	1			
Mehmet Tazebay	1			
Helge Zinner	1			
Thomas Hogenmueller	1			
Stefan Buntz	1			
Kirsten Matheus	1			
Alberto Alamo Alonso	1			
Wael Diab	1			
Yong Kim	1			
Thomas Mueller	1			
Jeff Heath	1			
Dave Dwelley	1			
Geoff Thompson	1			
Mike Bennett	1			
Richard Mei	1			
George Zimmerman	1			
Mabud Choudhury	1			
Christian Boiger		1		
Franz Goetz		1		
Yair Darshan	1			
Bryan Sparrowhawk	1			
Don Pannell			1	
Mike Jones			1	
Marius Vladan	1			
Stefan van Roeyen	1			
Ron Nordin	1			
Xiaofeng Wang			1	
Stefano Valle	1			
Dance Wu			1	
Sudhakar Gundubogola			1	
Gavin Parnaby			1	
Flavio Sestagalli	1			
David Law				1
Joseph Chou	1			
Bill Delveaux			1	
Hideki Goto	1			
Yoshihiro Ozawa	1			
Tomoyuki Koike	1			
Yoshifumi Kaku	1			
Takumi Nomura	1			
John Egan			1	
Hugh Barrass				1
Bernie Hammond	1			

Sterling Vaden	1			
Brad Booth			1	
Kevin Brown	1			
Francois Crepin	1			
Razavan Mihalache	1			
Carlos Pardo	1			
David Abramson	1			
Steve Carlson				1
	39	2	9	3