

Reduced Twisted Pair Gigabit Ethernet

Official Meeting Minutes

-Day 1

Tuesday

- Chair – Steve Carlson
 - Recording Secretary – Koussalya Balasubramanian
-
- Meeting called to order at 9:04AM
 - Number of People in room – 40
 - Introductions went around the room

Agenda Approval

- Motion to approve or change the Agenda

Moved: Brad Booth

Second: Gary <>

Motion passes by voice vote and agenda is approved

Approval of Previous Minutes

- Motion to approve minutes from may 2012

Moved: Jeff Heath

Second: Darshan Yair

Motion passes by voice vote and previous minutes are approved

Press

- No press present in the room

Meeting Goals

- Meeting goals were presented by Steve Carlson <goals in his presentation>

Introduction

- Chair went through
 - Ground rules
 - Electronic Information
 - IEEE structure, project process, Attendance tools
 - Hard copy sheets were passed around to record in-room attendance
- 9:23AM – Patent policy was read out by the chair
 - Chair asked if any of the members want to identify any patent claim / patent applications that affects the standards – None

Action Items from May 2012

- Reports from ad hocs chartered at May meeting
- Vote on new draft PAR,5C and objectives

Ad hoc Reports

- Ad hoc chairs were requested to come up and present their reports

RTPGE PoE Ad Hoc Report

- Presenter: Dave Dwelley
 - PPT used has copyright notice – Dave will remove it and upload a new one
 - Chartered to generate list of questions for automotive/industrial end uses about PoE needs in those industries
 - Draft of questions and responses posted to reflector
 - Dave Dwelley gave a Brief summary on Clause 33
 - Suggested RTPGE not preclude PoE and if appropriate consider a separate PoE CFI

Discussion on PoE Adhoc Report

- Should we consider including an objective to explore compatibility with clause 33 in RTPGE or Would it not be possible to add minor changes to clause 33
 - To be decided by team
 - Suggested we draft objectives in such a way that we go through the process without objectives getting changed
- Few people reinstated that the CFI done was for RTPGE and not PoE
- Channel is still getting defined so going PoE path cant be determined ahead of that
- Some people suggested an objective “**If** a 2-pair solution is chosen then nothing be done that is not compatible with clause 33”

PoE Ad hoc - Summary

- There is interest in room on PoE
- PoE not in scope of RTPGE CFI
- Craft carefully worded objective to place PoE in correct context without breaking anything

Link Segments

Presenter – Chris Diminico

Purpose

- Link Segment Characteristics->Phy considerations
- Technical Feasibility

1Gb/s full duplex operation over 3-connector link segments up to at least 15meters using twisted copper cabling with less than 4-pairs and meet the BER objective of less than or equal to $10e-10$

Discussion:

How to assume configuration – since the automobile connections are very complicated

- We can assume worst case possibility, pre-configure and test
- The way the connections are engineered will give us control over the parameters. We probably cant specify link segment physically but we can through performance.
- SI quality of harness – Automotive representative response “depends on who does the harness”

EEE Considerations for RTPGE

- Presenter – Michael Bennett
- Purpose
 - Requirements gathering for EEE in RTPGE
- Open Items/Questions to be addressed as part of Objective drafting
- Proposed text for objective “Define optional EEE operation for RTPGE”

Discussions:

Real time requirements should be met (eg low variability in timing specifications)

Automotive PoE requirements for RTPGE

- Presenter: Kirsten Matheus
- Summary
 - Power transmission over data line needs to be possible
 - Of interest for Smart sensors (<2W)

Discussion on Automotive PoE requirements for RTPGE

- Gauge is going to matter and this will control the line voltage
- We might have a mix of 12V and 48V in same car
- Line Voltage needed is not finalized by automobile industry
- Current wakeup mechanism is “separate wire” – when power is sent on it system wakes up – but industry wants to get away for this separate wire concept.
- Simple power on or off might not be all that is needed from EEE perspective.
- Today different wire gauges exists even within one system
- Minimum wire gauge today is 0.35mm² but 0.13mm² is in discussions
- The wires are Stranded
- Yair will send out his presentation on wire gauges to the reflector(the presentation came in late – so we wont be able to cover it in the plenary)
- Timing requirement on Power over data line?
 - Not considered yet
- Any Recommendation for minimum Wattage?
 - No
- Any technical preference between single conductor power(and use system ground) or balanced power (with its own return)
 - Point to keep in mind is some parts of the automobile are not connected to system ground
 - This needs to be clarified by the contributors

Dailmer Answers to PoE and channel model Ad hoc

- Presenter: Kirsten Matheus (presenting for Stefan Buntz, Thilo Streichert)
- Summary
 - Power levels stated are different from Bosch requirements
 - Power surges are “unlikely” as opposed to Bosch response of “likely”
 - Power fault action -> Switch to safe state (Bosch response :shutdown)
 - If there is cost advantage, PoE can be treated differently from non-PoE lines

Update on Required Cable Length

- Presenter: Kirsten (presenting for Stefan Bunzt, Thilo Streichert)
- Summary
 - Examples of long haul (15m,20m,30m) within Daimler were presented
 - Long Haul market potential was presented as well
 - Market for 40m is significantly smaller compared to 15m -> cost efficient solution needed for 15m (UTP), better cabling (eg., shielded, lower loss) can be considered for 40m

Discussion on Cable length

- In terms of accessories – is there data on what accessories are needed on different type of automobiles (bus, trucks, cars, vans)
 - Cameras were shown in the presentation (more cameras on bus as opposed to Vans), as for other accessories – need input from Daimler
- Are buses the only use case for 40m
 - No – Buses and trucks
- Is it possible to have a intermediary intelligence system in between for the 40m long haul
 - No

Intermission

- 12PM – Team departed for lunch
- 1:30PM – Team reconvened

Wake up for Automotive Communication Networks

- Presenter: Thomas Hogenmuller
- Summary
 - Different Terminal control (eg on/off , on/sleep mode etc.,)
 - Sleep mode current consumption considerations
 - Wake up requirements based on back over avoidance
 - Need for Fast wake-up mechanism to guarantee 100ms link acquisition time
 - Need for Reliable wake up
 - Need for power efficient sleep mode
 - Need to solve automotive power voltage issue (12V)

Tutorial on Lifetime Requirements and Physical Testing for Automotive ECUs

- Presenter – Thomas Hagenmuller
- Summary
 - Typical ECU requirements for ECUs used in engine compartment (Presentation is not a complete summary of requirements)
- Discussions
 - ECU to subdevices has no isolation, there are some ESD requirements though
 - Is the bus connection star or a single bus with multiple drops on it (this might define the requirement on multi-drop PoE)
 - It is single bus with multiple drops on it

Technical feasibility of Gigabit transmission on one or two pair cabling based on category 6a technology

- Presenter : Richard Mei
- Chair asked for permission to present updated presentation on “Technical feasibility of Gigabit transmission on one or two pair cabling based on category 6a technology” - None
- Summary
 - Test results were presented {Test results covered 1-pair/2-pair:8m,3 connectors; 12m, 5 connectors;40m,5 connectors}
 - PHY feasibility study
 - Mode conversion data presented
 - Both 1 pair and 2 pair systems are technically feasible, this data suggests that number of pairs will be determined by other parameters
- Discussion
 - Connector used is not automovite connector {Coming up with the connector is not part of RTPGE SG}
 - Feasibility of physically solving the problem, because the worst case scenario of aggressors (6 around 1) where all aggressors are same type, might be corner case {aggressors might be of different type}
 - Twisted pairs in cable should be kept together
 - Jacketed twisted pairs were investigated – bare twisted pairs were not (for 6 around 1 testing)
 - Measured impedance of the differential pair is $\sim 103\Omega$
 - Aging, mechanical reliability not considered in testing – commercially available cat6a cables were used for testing

PHY Feasibility study for one or two pairs RTPGE

- Presenter: Joseph Chou, Benson Huang
- Few backup slides are new – chair asked if the team has opposition against Realtek using this in the presentation if need be – None
- Realtek will upload new slide set with these backup slides
- Summary
 - Cable model from Commscope
 - Salz SNR for performance Evaluation
 - Alien crosstalk dominates overall noise
 - Bidirectional signal on each twisted pair assumed for comparison purposes
 - 1pair Vs 2pair comparison at PAM-4 and no NEXT/FEXT cancellation was shown
 - 2-pair has better SNR margin compared to 1-pair without alien NEXT/FEXT
 - 1-pair solution requires further study on channel coding to enhance SNR margin
 - Complexity comparison between 802.3ab, 2 pair RTPGE and 1 pair RTPGE presented
 - 1 pair is comparable to 2 pair
 - Both 1 and 2 pairs are technically feasible
 - 1 pair 40 meter deserves further study of performance impact caused by environment

Discussions on PHY Feasibility Study from Realtek

- 40nm technology or shrink more?
 - 40nm is used because it is existing technology
- Automotive industry expects to use the current technology available when a solution is decided on
- Complexity is per unit time (how many operations per unit time)
- Aging and EMC effects have to be understood
- AWGN number used (-140dBm/Hz) is what the industry uses
- No coding gain used– what is the overhead because of coding gain.
 - May be 25%- but that shouldn't affect the technical feasibility

RTPGE Feasibility Considerations on EMC

- Presenter: Shaoan Dai, Dance Wu, Kok-Wui Cheong David Tsui
- Summary
 - Electromagnetic Susceptibility
 - Electromagnetic Interference
 - Conductor asymmetry discussed
 - Immunity
 - Due to strong interference, high power Tx signal or wide BW are required
 - However high symbol rate requires better insertion loss performance
 - Emission
 - Stringent emission requirements limit the power that can be used to improve the SNR with strong interference

Discussion on EMC Considerations

- Automotive environment is harsh (25Kv transient etc.,) we should test in that environment
- Where does the 39dBm come from
 - Chosen from IEC standard
- What Simulation parameters were used to arrive at the Interference Frequency response
 - Discussion on transformer imbalance and the impact it might have on the response – something the team needs to include as next phase?
- DPI(Direct Power Injection) test method – how much is it related to differential mode to common mode conversion
 - IEC standard for evaluation ICs used as first step
 - If this can be extended for given channel that will be very useful

Update on EMC Requirements

- Presenter : Kirsten (presenting for Stefan Buntz, Thilo Streichert)
- Summary:
 - 3 different EMC levels (Vehicle, ECU, Component/chip)
 - Presentation listed all known EMC requirements
 - All EMC requirements on component level must be fulfilled with ECUs equipped with RTPGE connections.
- Discussion
 - Performance criteria might be the best way forward?
 - A specification comparison (between German specification and other national/international specifications) effort might still be worth
 - German specifications might be the toughest – as long as that is met other specifications most likely might get met

Slightly Beyond RTPGE

- Presenter : Geoff Thompson
- Summary
 - Wye-PHY vs curent Eye-PHY
 - Eye-PHY
 - One port up to MAC and one port down to MDI
 - Wye – PHY
 - 2 ports up and one port down to MDI
 - All current 802.3 PHYs are Eye-PHY configuration
 - 802.9 (Broadband ISDN) did a Wye-PHY(std 802.9a-1995)
 - The Wye-PHY configuration could have advantages in automotive environment and has potential of assisting EEE
 - Wye-PHY development at a later point might not be complex

Discussions on Beyond RTPGE

- Wye-PHY is like muxing between 2 networks?
 - It is an alternative to going into MAC and adding a preemptive mechanism
- Ratio between 2 MACs? And the effect on throughput as perceived by each MAC
- If process control and Gig side are the 2 up streams, the process control might be awake all the time and can be utilized for wake up call.
 - Its LPI from Gig point of view but process control is always up
 - It is slowing down the timescale of activity but activity is still there – not really LPI

Requirements Update

- Presenter: Kirsten Matheus
- Summary
 - Additional or update on requirements presented
 - BER $10e-10$ after equalization and decoding
 - Crystal Accuracy in automotive environment
 - Tradeoff between costs and start-up time should be taken into account
 - Requirements list update (includes feedback from Japanese car industry players)
 - Reach 15m/40m
 - PoE
 - Wake-up
 - 10uA Quiescent current
 - EMC

Day I - Meeting adjourned at 5:05PM

Day II

Meeting called for order at 10:45AM

Low latency discussion

- Request for tutorial to understand terminology of 802.1
- What is distinguished packet
 - A tag to distinguish time critical packet from normal packet
- MAC is part of 802.3 specification
 - MAC or below 802.3 owns it
- 802.1 is responsible for bridging
 - Above MAC is 802.1's charter
- It is a bad Idea to Crack open MAC to take care of low latency traffic

SG-Plan of Action

- Chair went through the goal again – “To draft PAR and 5C. The draft from this meeting will not be final”
- At next Geneva Interim-Any proposed changes will be presented and voted upon. Team to adopt a final PAR, 5C and objectives out of Geneva interim. The same will be submitted to 802.3 WG chair
- San Antonio Plenary – PAR, 5C and objectives to be presented and voted upon by WG during closing plenary.
- Post San Antonio Plenary – PAR and 5C will be forwarded to EC for approval, then sent to NesCom and finally the SASB.
- Request from Team to favor reflector for discussions over teleconference – so people who are travelling a lot don't miss out.

Motion #1

- Move that “IEEE 802.3 extend the Reduced Twisted Pair Gigabit Ethernet study group”

M: Jeff Heath

S: Darshan Yair

Taken by Voice

Procedural, 50%

Passed unanimously by voice.

Intermission – Day II

Team Adjourned for lunch at 11:05AM

Team reconvened at 1:07PM

PAR Drafting

- Scope, Project need were defined
- No questions were raised
- No comments were given

Motion #2

- Move to Adopt PARDrafttext_01_0712

Moved: Jeff Heath

Second: Mehmet Tazebay

(Technical-75%)

Yes:29

No:0

Abstain:0

Motion passes

Compatibility

- Compatibility was discussed
- Compatibility with auto-negotiation was raised and discussed
 - The automotive/industrial requirements are break away from current legacy approach
 - Structure it into objectives
 - Compatibility information doesn't preclude auto-negotiation

Motion #3

- Motion to “Accept compatibility response from 5C_new_form_RTPGE_01_0712”

Moved: Mehmet Tazebay

Second: Darshan Yair

(Technical-75%)

Discussion: None

Yes:26

No:0

Abstain:0

Motion passes

Motion #4

- Motion to “Accept Distinct Identity response from 5C_new_form_RTPGE_01_0712”

Moved: Richard

Second: Darshan Yair

(Technical-75%)

Discussion: None

Yes:32

No:0

Abstain:0

Motion passes

Technical Feasibility

- Discussion on re-ordering the points
- Reference to 10GBaseT was removed

Motion #5

- Motion to “Accept Technical Feasibility response from 5C_new_form_RTPGE_01_0712”

Moved: Geoffrey Thompson

Second: Mandeep Chadha

(Technical-75%)

Discussion: None

Yes:38

No:0

Abstain:0

Motion passes

Motion #6

- Motion to “Accept Economic Feasibility response from 5C_new_form_RTPGE_01_0712”

Moved: George Zimmerman

Second: Mike Bennett

(Technical-75%)

Discussion: None

Yes:36

No:0

Abstain:0

Motion passes

Motion #7

- Motion to “Accept Broad Market Potential response from 5C_new_form_RTPGE_01_0712”

Moved: Thomas Hogenmuller

Second: Darshan Yair

(Technical-75%)

Discussion: None

Yes:37

No:0

Abstain:0

Motion passes

Motion #8

- Define optional Energy Efficient Ethernet operation for Reduced Twisted Pair Gigabit Ethernet (Objective G in) RTPGE_objectives_07182012

Moved: Mike Bennett

Second: Wael Diab

(Technical-75%)

Discussion: (Around the possibility of EEE solution taking longer duration to come up with) Done

Yes: 37

No: 0

Abstain: 2

Motion passes

Day III

Meeting called for Order – 9:16AM

Motion #9

- Motion to accept objectives d,e,f and g as specified in document RTPGE_objectives_07192012.pdf

Moved: Mehmet Tazebay

Second: George Zimmerman

(Technical-75%)

Discussion: None

Yes:31

No:0

Abstain:0

Motion passes

Motion #10

- Motion to adopt “Select Line code that allows for future additional functionality” as draft objective

Moved: Dave Dwelley

Second: Jeff Heath

Discussions: Team felt there is no need for it for multiple reasons (reserved control codes already exists in standard, we cant include future outlooks – future projects are supposed to be backward compatible)

(Technical-75%)

Yes:0

No:26

Abstain:7

Motion fails

Motion #11

- Motion to “Support optional auto-negotiation capability”

Moved: Joseph Chou

Second: Albert

Discussion:

- The CFI was for 1G so why need an auto-negotiation
- Automobile industry doesn't seem to need it
- Though automobile industry doesn't need it – it might be useful to anybody who wants to utilize RTPGE
- The motion is for “Optional” capability
- Objective means we will do that work and if need be 802.3 allows objectives to be added at a later time
- Channel is not defined yet and the channel can be completely different from already existing ones – though objective is optional we still have to write it in the specification and only implementation is optional

(Technical 75%)

Yes: 9

No: 12

Abstain: 15

Motion fails

THANK YOU

RTPGE Study Group Sign-In Sheet -

7/2012

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RTPGE Study Group Sign-In Sheet -

7/2012

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