March 18-21, 2013
Orlando, FL, USA

Todd Herman, Recording Secretary

IEEE 802.3bp Reduced Twisted Pair Gigabit Ethernet PHY Plenary meeting convened at 09:00, Tuesday, March 19, 2012 by Steven B. Carlson, 802.3bp Task Force Chair

Attendance is listed in Appendix A

March 19, 2013

Administrative Matters

- Appointment of Recording Secretary – Todd Herman
- Welcome and Introductions
- Review Agenda

Motion #1: Approve Agenda
M: Kirsten Matheus S: Mehmet Tazebay
Voice Vote
MOTION: Passes Unanimously

- Review of Minutes from the January Interim Meeting in Phoenix

Motion #2: Approve Minutes
M: Gary Yurko S: Mandeep Chadha
Voice Vote
MOTION: Passes Unanimously

- Task Force Decorum
- Review the Meeting Goals
- Reflector and Web location review
- Meeting Ground Rules Review
- Attendance policy and tool
- Important Bylaws and Rules
- Patent Policy was read and call made for Potentially Essential Patents. No Declarations of Patents were made.
- Review of the IEEE Structure and P802.3bp Status
- Discussion on presentation timing, naming and filing was discussed. There are still some needs for improvement in all areas
- Future Meetings Review
    - May – Victoria, BC
    - July – Geneva, CH

Channel Definitions Ad Hoc Report - Chris DiMinico

- Chris provided the update from the March 4, 2013
- The presentation can be found at: Joint channel definition and EMC ad hoc – March 4th
- Chris requested that some of the presentation that were given in the Ad hoc be presented here for the Plenary group
    - Reduced Twisted Pair Gigabit Ethernet SG Test Fixtures was presented by Chris DiMinico. Channel Ad Hoc Teleconference Presentations ZIP File
    - RTPGE Test Head Proposal was presented by Richard Mei and Curtis Donahue
        - Simulation of the test fixture
        - Test results from both CommScope and UNH IOL
        - Results were from multiple samples and agreed very closely
        - They reviewed the initial De-Embed analysis
        - Richard presented a proposal for steam lining the initial Channel Testing by reducing the provided configurations to the worst case one or two channels

EMC Ad Hoc Report - Gavin Parnaby
Mehmet Tazebay

- Purpose is to understand and accurately quantify the noise environment for automotive applications
- Presented in presentation –
- The Action Item Tasks List spreadsheet was reviewed for Ad Hoc Status
- Round Robin EMC Testing will need to be done and Chris has secured an independent lab at no cost to the committee when we are ready.
- Common Mode Noise on Automotive Data Lines by Stefan Buntz was presented by Mehmet
    - Presented the stationary contributions for different states of the vehicle
    - This was only internal vehicle sources
    - Measured at different points of the car by current clamp on various of cable harnesses for the CAN data lines
    - Presented an overall emission results on all positions of the car with Engine running and ignition on through HF Sweep
    - Most noise can be seen between DC and about 100MHz, above coupling of GSM signals
    - The most critical state is the engine start or engine running, as expected
    - Influence of potential external disturbers cannot be shown with these measurements
    - Questions were asked about the measurement process. A: This was conducted on the CAN bus because it is the closest to the proposed unshielded RTPGE solution

PRESENTATIONS per Agenda

Common Mode Noise on Automotive Data Lines – Stefan Buntz

- This was presented as part of the EMC Ad Hoc by Mehmet

Reduced Twisted Pair Gigabit Ethernet Link Segment Characteristics – Chris DiMinico

- Presentation directed at identifying the link segment insertion losses for the targeted 15m and 40m channels
- Review of the 4 connector automotive channel configuration
- Reviewed the calculation of the insertion loss across the various conductor sizes
- Proposing a Temperature correction factor
- Automotive operating environment
- Belief that this will require a non-PVC insulation
- There were questions concerning the loss of the connector, as well as cross talk
- There is still concern with the MDI interface to the CPU that is not currently part of the link segment being measured.
- Discussion on topology and alien cross talk validity

RTPGE Cable and Channel Considerations - Presented by Todd Herman

- The Agenda of the presentation was to provide various calculations and measurements to propose a recommendation for Performance Specifications
- A cable IL Model was reviewed with *k*1, *k*2 and *k*3 parameters
- Predicted loss was presented for both Solid and Stranded
- Presented a comparison between predicted and tested thermal evaluation of both solid and stranded cable
- Recommended a 20% de-rated Cat6A IL Requirement for RTPGE Stranded cables
- Require a temperature dependency for IL
- Presented results of insertion loss of cable under Flexure testing
- Recommendation
    - Cable, connecting hardware, link and channel performance per well defined in ISO Class EA and TIA Cat-6A standards
    - adopt ISO Class EA specs for non-length dependent parameters such as RL, NEXT, PSNEXT, PSANEXT and PSAACR-F
    - Length scaling is required for the following parameters: IL, ACR-F, PSACR-F, Delay and Skew
    - LCL, LCTL, TCL, TCTL should be specified based on EMC modeling study

- It was suggested that, even though this may be where we end up, we table this level of recommendation for performance levels for one or two more meetings to support additional validation testing
- It was recommended that a single wire gauge is selected to build the requirements around and 26AWG was proposed.

RTPGE Test Head Proposal - Richard Mei
Curtis Donahue

- This was presented as part of the Channel Ad Hoc Review

Electro Magnetic Emissions and Susceptibility for RTPGE w/ PAM & DFE – Will Bliss

- Presented a proposal for solving the performance of the DFE RX optimized for white noise at the RX input with a TX mask
- Use of a strip line measurement
- Assuming a PAM-M Transmitter
- Presented an EMC model for RTPGE with PAM and DFE
- Looked at a class of PAM-M transmitters with Low Pass TX filters
- A class of Low Pass TX PSD mask was shown to create an Effective channel with higher IL
- The performance against sine wave interference at the RX input was calculated and shown to be maximized by choosing smaller 'M' PAM-M, even though it requires higher band widths
- Future work will be needed in a number of areas, i.e. TX PSD Mask, interference levels of Radiated Immunity, Impulse type Noises, Consideration of other architecture performance issues, and customer requirements

Environmental Conditions for Industrial Areas – Bob Lounsbury

- There are two sets of environments
  - Minimum Legal test limits
  - Expected conditions based on MICE (Mechanical, Ingress, Climatic/Chemical, Electromagnetic)
- There are 3 classification for MICE with increasing severity ranging from commercial office to harsh industrial environments: Office/Commercial, Light Industrial/Industrial, and Heavy Industrial
- Environmental areas of a Factory
  - Telecommunications Room – $M_1I_1C_1E_1$
  - Factory Floor – $M_2I_2C_1E_1$
  - Automation Area – $M_1I_2C_3E_2$
  - Automation Island – $M_3I_3C_3E_3$

- Performance ranges were provided for the three classifications for sub-parameters within the different areas of MICE
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Industrial Cabling Channel – Bob Lounsbury

- Presented the preliminary cabling requirements for 1G signaling targeted for high noise, high temperature environment
- Desire a 1 or 2 pair cable with 23 to 26 AWG stranded conductor
- Presented many physical or mechanical parameters
- The do allow shielded solutions
- Presented cable performance parameters that ran through 250MHz

A request was made to the Ad Hoc Chair to present a current "state of the union" for each of their areas. This will be presented tomorrow.

It was reported that P802.3bp has been assigned Clause 98 for the standard.

Adjourned for the day, March 19, 2013

Wednesday, March 20, 2013

Meeting was started at 09:00

Review of upcoming meetings

- May 2013 Joint Interim
  - Victoria, BC, Canada
  - May 13 – 17 (P802.3bp meets Tuesday-Wednesday, May 14-15)
- July 2013 Plenary
  - ITU, Geneva, CH
  - July 16-19

Meeting Demystified – It was validated that everyone in the room understands the difference between Plenary and Interim meeting.

Channel Ad Hoc Planning – Chris DiMinico

- Reviewed the Link Segment Definition Process
- Proposing that we start to limit the focus of development until proven unfeasible
  - Determine if any modulation scheme with unshielded cables and connectors can be expected to perform adequately – Consider cost performance by July, 2013
  - Refine customer requirements by May, 2013, for:
    - Elecro-Magnetic Emissions and Susceptibility
    - Length, insertions loss

        - 26 AWG stranded (target)
        - 125˚C (target)
    - Considerable discussion was made around these points and plan
    - The target of July, 2013, was made to define the path for this standard
    - There was an informal voice vote for accepting this as a starting point and it was accepted by all in the room

EMC Ad Hoc Planning – Mehmet Tazebay

- Addressing not only the EMC, but also the overall noise levels
- Review of work to be done:
    - Ingress Modeling
        - Define noise sources
        - Define channel transfer function measurement/modeling methodology
    - Egress Modeling
        - Block diagram for PHY emissions
        - Define emissions' mask
        - Define Measurements to be made
    - End to End EM ingress model
    - End to End EM egress model
    - Find agreement on worst case limit lines
- What is missing in EMC Ad Hoc
    - Background noise – sources and levels
    - Impulse noise – sources and levels
    - EMI – consensus for the limit line
    - Immunity – consensus for a limit line
    - Alien xTalk – need to evaluate topologies provided
    - EMC Channel Transfer Function – methodology to measure the mode conversion transfer function

Motion #3: Move to Adjourn
M: Chris DiMinico S: Yair Darshan
Voice Vote
MOTION: Passes Unanimously

AHMAD Nouri BROADCOM BROADCOM anouri@broadcom.com | W | an

P802.3bp Task Force Sign-In Sheet - March 2013

Name	Company	Affiliation	Email (optional)	T	W	TH
STEVE CARLSON	HSD	HSD		SC		
DALE DULECLEY	LTC	LTC	ddwelley@ieee.org	DWD	DWD	
Mehmet Tazebay	BRCM	BRCM	mtazebay@broadcom.com	MT	MT	
Kirsten Matheus	BMW	BMW	kirsten.matheus@bmw.de	KM		
BZ Shen	BRCM	BRCM	bzshen@broadcom.com	BZ	KM	
Mandeep Chadha	Vitesse	Vitesse	deep@vitesse.com	MC	MC	
Curtis Donahue	UNH-IOL	UNH-IOL	cdonahue@iol.unh.edu	CKD	CKD	
Dave Estes	UNH-IOL	UNH-IOL	daestes@iol.unh.edu	DE	DE	
Stefano Valle	STMICROELEC.	STMICROELEC.	stefano.valle@st.com	SV	SV	
Shaoan Dai	MRVL	MRVL	sda@marvell.com	SD		
Bob Lounsbury	Rockwell Automation	SAE	relounsbury@ra.rockwell.com	RO	RL	
DAVE HESS	CORD DATA	INDEPENDENT	davecarlhess@outlook.com	DH	DH	
Richard FROSCH	PHiHong USA	PHiHong USA	RickF@PHilong.com	RF	RF	
Yan ZHUANG	Huawei	Huawei.	zhuangyan.zhuang@huawei.com			
Gary Yurko	TE	TE	gm.yurko@te.com	GMY	GMY	
CHRIS DIMINKO	MC COMMUNICATIONS	MC COMMUNICATIONS	CDIMINKO@IEEE.ORG	C.D		
CARLOS PARDO	KDPOF	KDPOF	carlos.pardo@kdpof.com	CP		
J. Francois CREPIN	AKROS	AKROS	francois@akrossilicon.com	JC		
Pavlicic Rimbaud	Microsemi	Microsemi	rimbaud@microsemi.com	PR	PR	
Will Bliss	Broadcom	Broadcom		WB		
BRIAN SPAROWHAWK	LEVITON	LEVITON	BSPAROWHAWK@LEVITON.COM	BS	BS	
MARTIN McNARNEY	BRCM	BRCM	mcnarney@broadcom.com	M		
DENIS BEAUDOIN	TI	TI	dbeaudoin@ti.com	DB		
Aleksandr Babenko	Molex	Molex	sasha.babenko@molex.com	AB	OB	
MIKE GARDNER	Molex	Molex	mike.gardner@molex.com	MG	MG	

Robert Grow RMG Consulting Self TE bobgrow@comcast.net RM

~~Gary Yurko~~ TE BEL BEL gyurko@sumtel.com YB

~~YAKOV~~ BELOPOLSKY

~~CHRISTIAN BETA~~ STMICRO STMICRO christian.beta@st.com

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Name	Company	Affiliation	Email (optional)	T	W	Th
XIAFENG WANG	Qualcomm	Qualcomm	wangxiae@qualcom	XFW	XFW	
Yin Wang	Qualcomm	Qualcomm	yinwang@qti.qualcomm.com	Yin	Yin	
Richard Mei	CommScope	CommScope	RMei@commscope.com	RM	RM	
Todd Herman	CommScope	CommScope	therman@commscope	TH	TH	
Christian Beia	STMicro	STMicro	christian.beia@st.com	CB	CB	
Bill Delveaux	Cisco	Cisco	bdelveaux@gmail	WD		
Chad Jones	Cisco	Cisco	cnjones@cisco	CJ		
Dansha Yan	MSCC	MSCC	ydansha@microsemi.com			
David Abramson	TI	TI	david.abramson@ti.com	DA		
Sudhakar Gundapaneni	~~Marvell~~	Marvell	sudhakar@marvell	SG	SG	
David Tremblay	HP	HP	david.tremblay@hp.com	DT	DT	
Wael Diab	Broadcom	Broadcom	wdiab@broad...	WD		
Jeff Heath	Linear	Linear	jheath@linear.com	JH	JH	
Gavin Parnaby	Marvell	Marvell	gparnaby@marvell.com	GP	GP	
Koussalya B	cisco	cisco	Kobalasu@cisco	KB		
Ahmad Nouri	Broadcom	Broadcom	anouri@broadcom.com	A.N		
Chris Diminico	MC Communication	same	cdiminico@ieee.org	CDM	CDM	
~~[illegible]~~	~~[illegible]~~	~~[illegible]~~	~~[illegible]~~			
~~[illegible]~~	~~[illegible]~~	Media				
Ron Nordin	Panduit	Panduit	rnano@panduit.com	RAN		
Ron Tellas	Panduit	Panduit	rtte@panduit.com	RTE		
~~[illegible]~~	Leviton	Leviton	~~[illegible]~~			
Keith Kosowski	Leviton	Leviton	KKosowski@leviton.com	KK		
~~[illegible]~~	~~[illegible]~~	~~[illegible]~~	~~[illegible]~~			
Phil Brownlee	Concept	Concept	pbrownlee2@cox.net		PB	
George Zimmerman	CME Consulting	Commscope/ Agunite	george@cmeconsulting.com			
Peter Wu	Marvell	Marvell	xingyu@marvell.com			
Joe Berry	Bel Fuse	Bel Fuse	jberry@belf.com			