# Unconfirmed minutes
# IEEE 802.3 HSSG Interim meeting
## Coeur d'Alene, ID
## June 1st to 3rd 1999

**TUESDAY 1 JUNE**

**ADMINISTRATIVE MATTERS**

Welcome and Introduction – Mr Jonathan Thatcher.

Mr David Law was persuaded to take the minutes for the meeting. He agreed to do so on the basis that his colleague, Mr Edward Turner, would assist him in this task.

Copies of the meeting minutes from 10G Ethernet Call for Interest meeting at the March IEEE 802 Plenary distributed. Details of the IEEE 802.3 HSSG reflector and website were given.

Mr Tom Dineen pointed out that people need to be aware of the IEEE patent policy if they intend to propose proprietary technology. Mr Geoff Thomson replied that he would explain more details of the IEEE patent policy at the next Plenary meeting.

Mr Geoff Thomson then went on to explain what the PAR and five criteria were and how they fitted into the Standards process.

The attendance books were circulated and Mr Bob Grow explained how to sign them.

Mr Geoff Thomson then explained further details for voting in the Study Group. He stated that Study Groups can make their own voting rules if they wish and that Mr Jonathan Thatcher was the temporary chair but that the group must either affirm this or at some point initiate proceedings to elect an alternate chair. He stated that the opportunity to do this would take place at the end of this meeting.

Mr Jonathan Thatcher reviewed progress and stated that the next HSSG meeting will take place in Montreal and that there would be an interim meeting in September in York, UK. He then went on to state that the primary objective for this week was to define the objectives for the Study Group or to put a plan in place to refine open objectives. He stated that a secondary objective for the week was to also improve technical knowledge.

Additional requests for presentations were then taken from the floor and the agenda was updated.

***PROCEDURAL MOTION:***

Approve the agenda, as amended.

Move: Tom Dineen
Second: Peter Wang

PASSED by Acclimation

Approval of the amended agenda was carried by acclimation as recorded above. The presentations, as listed on the amended agenda, then started.

**PRESENTATION**

### NCITS T11.2 assistance to the HSSG - Mr Rich Taborek

Mr Rich Taborek explained that NCITS were concerned with the HSSG / NGIO work since the development could be slightly different to their own and the standards would be different. He had proposed the promotion of TG11.2 to TG11 so that they will take standards other than Fibre Channel into account during their work. He stated that the advantages would be that experts are already in place to work on the issues and that there is a possibility that a common PHY could be developed which would allow component sharing across standards.

Mr Taborek was asked if T11 was looking at transmission speeds at 10 Gig. He replied that they were not and that the speeds being looked at were 2 and 4 Gig. In addition, they were focussing on copper for the transmission media rather than optical implementations.

Mr Jonathan Thatcher made a point of information - several PHY companies had contacted him to say that they would have a strong interest in the HSSG developing a common PHY.

A concern was stated that this would lead to the development of PHYs in another group for whom the development would not necessarily be a primary activity. Mr Taborek replied that he had envisaged handing over specific tasks such as jitter analysis to T11 rather than complete PHY developments.

Mr Geoff Thomson asked what specific proposal Mr Taborek was making. Mr Taborek replied that his proposal was for a more formal liaison process between the IEEE and T11, rather than the current reporting process.

Mr Brian Lemoff stated that he was concerned with splitting development between IEEE and T11.2 since this would be inefficient and it could take the standardisation process longer to complete. Mr Taborek stated that the schedule should not be a problem since many vendors attended both IEEE and T11.2 meetings.

### Market requirements - Mr Bruce Tolley

The presentation was an update of the material which Mr Tolley gave at the March Plenary. Mr Tolley started with a summary of his previous presentation and then went on to suggest that we needed a better idea of what made up the currently installed base of fibre. He pointed out that the charts that he had presented on the last installed fibre base survey did not have fine granularity around 220m or above 500m. If the survey were to be repeated then information about the installed distance, fibre type and bandwidth would be required. Mr Tolley pointed out that the BICSI survey would only cover what is currently being installed and what has recently been installed and he strongly recommended a new survey to determine the actual installed fibre base.

Mr Tad Szostak pointed out that several efforts were in place that could generate different results and would have to be interpreted with care.

Mr Geoff Thomson pointed out that we would also have to find out the turnover rate of the installed fibre base. He stated that it was probably short for copper but did not know what it was for fibre.

Mr Roy Bynum pointed out that the survey would have to be very specific in selecting which areas and groups were questioned.

Mr Jonathan Thatcher asked for the level of interest in a fibre survey. Based on the response he then formed the fibre survey Ad hoc and appointed Mr Bruce Tolley itschair.

**Action:** Ad hoc chair to bring together parties interested in undertaking a fibre survey and form a motion by the end of the week's meeting.

**BICSI Fibre survey - Mr Tad Szostak**

Mr Szostak explained that BICSI would be providing their survey results during the next week and that it would be possible to have the results of an installed fibre base survey ready for the July Plenary. Mr Szostak then described what BICSI and the services they provided.

Mr Chris D Minico pointed out that it could take several weeks to distil and process the survey results. There was a question as to whether the survey would cover the installed WAN base. Mr Szostak replied that the survey would cover campus LANs up to 3km.

**10XGbE in WAN - Mr Bill St. Arnaud**

Mr St. Arnaud was not present to give his presentation. Instead Mr Jonathan Thatcher quickly talked through the slides that Mr St. Arnaud had prepared. Mr St. Arnaud will be present at the July meeting where he will give his presentation in detail.

Mr St Arnaud's presentation explained that many organisations were using dark fibre and gopher bait fibre for their MAN and WAN applications. He stated that GbE was cost effective when compared to SONET and that the cost of long haul 10GbE should be compared to SONET rather than GbE. The presentation concluded with some recommended requirements for the HSSG.

It was asked what the terms CLEC and 'Gopher Bait' on the slides meant. It was stated that CLEC stands for Competitive Local Exchange Carrier. Mr Roy Bynum explained that Gophers chew the fibre and this reduces the performance, hence the term Gopher bait. Mr Geoff Thomson suggested that the term be changed to Ether Bait.

**Extended User's Perspective - Mr Roy Bynum**

Mr Bynum did not have time to prepare slides for a presentation. A summary of his talk is given below:

Mr Bynum explained that he had been chartered by his company to create an optical IP network. He gave an example of a distance learning system that was using GbE over half of Texas without using TDM and SONET. He pointed out that going from LAN to WAN was just a change in transceiver and that 802.3 can become the de-facto standard in the WAN. He stated that the main problem is management of the fibre plant since there were no MIBs for items such as launch power. He explained that a GbE installation was approximately one tenth of the cost of a similar bandwidth ATM installation and one quarter the cost of a TDM installation.

Mr Bynum stated that he had built a demonstration lab for optical systems using optical switches. He also stated that Siemens had announced long distance transmission of GbE in Europe. He re-iterated that moving to fibre has changed the applications for which Ethernet is used and that Ethernet had taken ownership of data networking. He stated that the definition and support of Ethernet for long haul would have to be addressed with 10GbE and

that users were migrating away from traditional carriers towards VoIP. Mr Bynum explained that the challenge was to recognise and accept the following:

1. Ethernet is the de-facto native data system,
2. Optical networking is a WAN system,
3. Support systems will be required to manage the optical plant.

He also stated that there were several issues that would have to be addressed. These included:

1. Performance management to measure errors within packets,
2. Subscription control using flow control,
3. Fixed rate overhead control or reverse signalling to signal problems downstream,
4. Trail identification to identify data streams within a fibre or a switch,
5. Maintenance, a mechanism would be required for a maintenance channel since you cannot simply bring down a high-speed links for maintenance.
6. Protocol identification to tell a SONET system from a 10GbE system.

Mr Bynum also mentioned the Optical Interoperability Forum (OIF) and SONET Interoperability Forum (SIF). He stated that dark fibre was being used now for GbE applications and that the only way to stop 10GbE being used in the WAN would be to restrict it to operating only over copper.

Mr Del Hanson asked whether the existing 802.3 flow control was adequate for today's applications. Mr Bynum replied that it was adequate for enclosed systems, but that there may have to be some changes to it for the long haul applications. He suggested that a windowing environment might have to be used instead of pause frames.

Mr Tom Dineen raised a question on protocols and where they are used. He stated that the issues raised by Mr Bynum were currently addressed in the SONET standard and if you wanted to run a WAN then it should be done using a WAN standard such as SONET. He suggested that if all the required SONET features were added to 10GbE then there would be a cost overhead that could make 10GbE as expensive as the SONET. Mr Bynum replied that SONET chip sets were expensive because they used technology such as GaAs. A point was made from the floor that much of the SONET cost arose out of the tight jitter requirements in regenerators and that low volumes also prevented a drop in cost.

### User perspective on 10Gig - Mike Bennett

Mr Bennett described the network configuration at the Lawrence Berkeley National Lab and their predicted bandwidth use in the near future. He explained what the installed base of fibre was and what it was used for. He pointed out that the HSSG should plan to write the standard using good fibre rather than badly specified MMF. He stated that the majority of the connections were full duplex. He also stressed that the MTU frame size should not be changed since that would make hundreds of pieces of his network equipment obsolete. He finished by stating that there was a need for 10GbE at present and that the primary focus should be for a low cost LAN solution. During his review of bandwidth measurements it was pointed out that there is a difference between LED and Laser based bandwidth measurements.

Mr Tom Dineen asked whether a facility to auto-negotiate the MTU frame size would be an acceptable solution. Mr Bennett was not convinced that this was.

Mr Kevin Daines asked whether flow control was used on the network and whether it was adequate. Mr Bennett replied that it was used and that on a congested network he had seen no data loss. Mr Mike Salzman asked whether any side effects had been observed and Mr Bennett replied that none had been seen.

At the conclusion of the presentation the meeting then broke for lunch. The meeting reconvened and the presentation continued.

**PRESENTATIONS (Continued)**

### Objectives for Higher Speed 802.3 - Mr Bob Grow

Mr Grow reviewed eleven possible objectives for the HSSG.

Mr Grow explained that objective 6 was optional since the interface can be within the chip and there is no requirement to make it visible or testable.

With respect to objective 8, Mr Roy Bynum asked whether there would be different signalling and framing methods. Mr Grow's answer was yes.

Mr Chris DiMinico warned against jumping straight to 10G since a lot of technology would be left behind with such a large jump. It would not be possible to evolve the PHY to such a high speed.

With respect to objective 10, Mr Grow remarked that the standard should pick the most common type of fibre and instillation. Other types would be variants. Mr Tom Dineen asked whether the low bandwidth tail of the installed fibre base would be included in this. Mr Grow replied that it would not if this was too difficult to do.

Mr Jonathan Thatcher asked whether leaving out a maintenance function in objective 11 would preclude long distance applications. Mr Grow replied that the item was there to prevent sins of commission rather than sins of omission and that the intention was that something should not be placed into the standard that precluded long distance operation.

Mr Grow was asked if there was any need to address short links of the order of 10m. He replied that long link PHYs could be made to work over short distances and unless there was a big market for short links then they would not be specifically addressed

Mr Tom Dineen asked if there was any political issue in having to support half duplex for distinct identity. Mr Grow replied that there was not.

### Requirements for MAN - Mr Nader Vijeh

Mr Vijeh asked to postpone his presentation until the following day.

### 10Gig Architecture and Objectives - Mr Mike Salzman

Mr Slazman's presentation started by examining the potential applications for 10GbE. He then went on to discuss the requirements for the LAN and stated that a new specification for multi-mode fibre should be drawn up. The next part of the presentation looked at the architecture of MAN and Access networks. He followed this with a discussion of a proposed new interface structure that included details of the transmission control and frame structure. He concluded the presentation with an examination of the PMD distance and cost considerations.

Mr Bob Grow asked what the advantage of the new multi-mode fibre was over single-mode fibre. Mr Salzman replied that the new multi-mode fibre should be cheaper since it could support SX systems of all speeds from 10 Meg to 10,000 Meg.

Mr Roy Bynum asked whether a frame was being defined as a packet or a fixed length of data. Mr Salzman replied that the frame was an Ethernet packet.

Mr Geoff Thomson asked whether Mr Salzman was suggesting that it would not be possible to achieve further distance with new fibre. Mr Salzman replied that he was just suggesting 300m as a useful distance aim.

## Architecture for a 10-Gigabit Ethernet Standard - Mr Shimon Muller

Mr Muller explained that there were different customer requirements for long, intermediate and short haul applications. He then went on to describe two architectures that he believed would satisfy all the requirements. These two architectures were a serial 10G solution and a four channel 'striped' solution. He described the principles of operation of the two systems and the requirements for physical coding and framing. Mr Muller then went on to describe the possible media independent interfaces within his proposed systems and the signalling which they could use. He finished his presentation by describing the error handling within the proposed system.

Mr Muller was asked if he supported multiple aggregation over copper links. He replied that he would. He was then asked to explain the difference between the 100m bundled fibre solution and the 300m single fibre solution. Mr Muller replied that the intention for the bundled fibre version was for an extremely low cost link, and the 300m link was intended to be a WDM implementation. He stated that the proposal was to standardise both implementations and allow the market to decide the preferred version.

Mr Geoff Thomson asked Mr Muller to clarify the '1G' label at the base of slide 10. Mr Muller replied that this was an error and that the text should read '10G'

Mr Roy Bynum asked whether it would be possible to include a management feature that indicated which channel was disconnected in a multi-channel link. Mr Muller replied that it could be possible, but that he was not proposing that such a feature should be included.

Mr Muller was asked whether he had investigated the different silicon options and operating voltages required to implement his proposed 'GMII' options. Mr Muller replied that he had not.

Mr Muller was asked whether he would require different BER specifications for the different systems. He replied that the BER had yet to be defined, but that he expected each system to have a different BER.

## Architecting the Document - Mr David Law

Mr Law's presentation described which clauses of the current 802.3 standard would have to be modified for a higher speed standard and which new clauses might have to be added.

Mr Bob Grow asked whether Mr Law had given any thought to the fact that 802.3ad were doing SNMP. Mr Law replied that while their 30C Annex did indeed cover SNMP, 802.3ad were also updating the Annex 30A and 30B GDMO. He stated that he would not advocate 10G taking on the task of converting the current standard to SNMP and since he expected only changes would be needed to Clause 30 for 10G, only the GDMO should be updated.

Mr Bob Grow pointed out that the pause operation was something that would have to be examined carefully if long haul applications were taken into account. Mr Roy Bynum pointed out that there were different issues for windowing and denial protocols. Mr Law replied that this was only a denial protocol.

Mr Bob Grow asked how the topology section of the standard should be written. Mr Geoff Thomson suggested that round trip delay could be covered in each PMD, otherwise it could be covered in the introduction.

## Auto-negotiation - Mr Rich Taborek

Mr Taborek's presentation described a proposal for a tone based auto-negotiation system, which could be used in the higher speed standard.

Mr Shimon Muller asked how it would be possible to auto-negotiate with the current 802.3z Gigabit standard. Mr Rich Taborek replied that it would not be possible to perform such an auto-negotiation and that what he was proposing would be between MAS, WWDM and serial 10G. This auto-negotiation could only occur if there was a common wavelength between all three options.

Mr Geoff Thomson asked whether Mr Rich Taborek had examined the system being discussed by the TIA for 100Mb/s. He replied that he did not believe that particular system would scale to gigabit speeds.

At the conclusion of the discussion of this presentation the meeting adjourned for the day.

**WEDENSDAY 2 JUNE**

**ADMINISTRATIVE MATTERS**

Mr Jonathan Thatcher re-convened the IEEE 802.3 HSSG. The attendance lists were circulated and Mr Bob Grow reminded everyone of the attendance books procedures.

The presentations then continued.

**PRESENTATIONS (Continued)**

**PCS/PMA interfaces for 10Gb/s Ethernet - Mr Richard Dugan**

Mr Dugan's presentation examined the requirements for the interface between the PCS and the PMA and then proposed some solutions for optical and copper PCS / PMA interfaces.

**Transceiver Interface 'Clay Pigeons' - Shawn Rogers**

The presentation described two proposals for a MAC/transceiver interface and some proposals for a PMD/media module interface.

Mr Bob Grow asked how the system would work when striping data without a separate PCS per channel. Mr Jonathan Thatcher replied that there would have to be some skew control within the system.

**MII issues for 10Gbps operation - Mr Bob Grow**

The presentation explained why an MII was a useful feature and the requirements for a HSSG MII. Mr Grow described some options for the MII and then went on to look at the issues for the MII that included frame delimitation and octet alignment. He stated that the interface would be closer to the MII than the GMII since there would be no need for the extra signalling required for carrier extension.

Mr Dave Dolfi stated that it was preferable to create narrower interfaces since a wide interface would generate ICs with large IO rings but little silicon within.

**10GbE for MAN - Mr Nader Vijeh**

The presentation looked at the features in SONET which are used in the MAN. He started by stating that the MAN market potential was large for 10GbE as service providers would be looking to reduce cost. He stated that customers would want to be able to monitor the service level agreements that they had arranged with their access provider. He then went on to look at the SONET architecture; this included an overview of the layers, frame structure and different overhead signals. He then explained the error conditions that are signalled under SONET and the various failure classes. Mr Vijeh concluded his presentation by pointing out the relevant features used in SONET and discussing the issues that should be addressed by 10GbE.

Mr Bob Grow pointed out that 'repeater' should read 'regenerator' since the term repeater had special meaning to 802.3.

**mB810 coding - Mr Changoo Lee**

Mr Lee was unable to attend, so Mr Jonathan Thatcher ran very quickly through the presentation. He stated that Mr Lee would be presenting the material himself in July. He then went on to ask interested parties to contact him if they wished to contribute to a study on a coding scheme stating that this was a request from Me Lee.

## Scrambled encoding for 10GbE - Mr Paul Bottorff

Mr Bottorff's presentation explained the advantages of scrambling and how a scrambler would fit into the PCS layer. He then proposed a two polynomial scrambler system and explained how it would work. Mr Paul Bottorff then went on to explain how frame delimiting and synchronisation could be achieved. He went on to discuss control frames, link error rate monitoring and unifying Ethernet into the WAN.

Mr Del Hanson asked whether the proposed scrambling system was the same as that used in ATM. Mr Paul Bottorff replied that it was. He was the asked whether there was any error propagation from the X^7 polynomial and what the overall efficiency of the system was. He replied that there no error propagation and that that there was overall about a 4 percent overhead in this scheme.

Mr Paul Bottorff was then asked why there was a need for a scrambling system compatible with SONET when the data would be carried over different wavelengths. Mr Bottorff replied that it was required when using mixed SONET systems such as regenerators where there could be decoding.

Mr Paul Bottorff was then asked about forward error correction. He replied that it could be used instead of parity checking and if required he could bring a proposal to the study group.

Mr Paul Bottorff was asked what the challenges were for clock recovery. He replied that they had undertaken studies and would make presentations. He stated that more rigid phase locked loops were required since there can be longer periods of imbalance and also stated that the impact of jitter would have to be studied.

A member of the group stated that the PLLs for SONET and 8B10B implementations were identical.

Mr Geoff Thomson stated that this approach would break certain things that were taken for granted in Ethernet:

1. The need to provide the length of the packet in the header - how would this be done?
2. What is the delay through the PHY due to sync markers?

Mr Paul Bottorff replied that the length could be supplied from the MAC or by measuring the length in a buffer in the PCS layer. He further stated that a pacing mechanism would be required on the 10GMII on both transmit and receive.

## 10G physical layer options and coding issues - Mr John Ewen

The presentation looked at the trade off between technology cost and performance. He then went on to look at the issues with parallel optics and in particular, laser safety. Mr John Ewen then examined serial 10Gbps and the issues of clock and data recovery for such a system. He then looked at the tradeoffs between coding and scrambling schemes and the implications for implementing such schemes.

SLIDE CORRECTION - 156MB should read 312MB on the '8B/10B Implementation' slide.

Mr John Ewen was asked whether equalisation was used in the system where the eye diagram was shown. He replied that there was no equalisation.

Mr John Ewen was asked whether the silicon was available now. He replied that it was and had been used as a test device.

### MAS Technology and Applications - Mr Rich Taborek

Mr Taborek's presentation started with a review of the technical requirements for 10GbE and the design challenges that would be faced. He then reviewed SNR and BER definitions and went on to compare single channel to multiple channel solutions. Mr Taborek then described different multiple level signalling techniques, including PAM-5 and T-Waves and he showed the result of simulations of the different systems. He then went on to discuss coding and scrambling issues. This discussion also included convolutional codes, Trellis coding and Viterbi decoding. He then explained his proposal for the MAS based PHY. This included a block diagram of the optical system, the PCS and PMA layers, auto negotiation and the PMD. Mr Taborek concluded his presentation by explaining how MAS addressed the PAR criteria.

Mr Roy Bynum asked whether any work had yet been done on polarisation and modal dispersion. He replied that it had not yet been investigated.

Mr Brian Lemoff asked about the different dispersions which had been observed on MMF. Mr Taborek replied that with sinewaves over MMF there are different dispersions. He stated that for invariant systems, compensation techniques could be applied to the received signal but that this would be difficult to do at higher data rates.

Mr Geoff Thomson stated that he was concerned with getting linearity specified by vendors. Mr Taborek replied that vendors given little information on linearity, although lasers used in cable TV applications were well characterised.

Ms Lisa Buckman asked what RIN was required in the lasers. Mr Taborek replied that RIN numbers from 120 to 155 were supplied by vendors and although not enough work had been done to find out the required RIN he expected it to be between 125 and 130.

### Optical Link for Radar Digital Processor - Rob Marsland

Mr Marsland's presentation described a 10G 850nm VCSEL network which had been developed. He described the transceiver manufacture and packaging. He went on to describe the receiver schematic and gave example eye diagrams. He then described the transmitter schematic and again showed example eye diagrams. He concluded the presentation by describing the system test set up and reviewing the results from the testing.

At the conclusion of the presentation the meeting adjourned for lunch. After lunch the presentations continued.

## PRESENTATIONS (Continued)

### WWDM for Metropolitan Area Applications of 10GbE - Mr Vipul Bhatt

Mr Bhatt's presentation described a proposal for a four channel WWDM system centred about 1530nm using isolated DFB lasers. He described the operating temperature range and the specifications for the WDM coupler. He then went on to explain the link power budget. He finished the presentation with the advantages and disadvantages of the proposal.

Mr Brian Lemoff asked what the proposal for the transceiver was. Mr Bhatt replied that he had not given detailed thought to the implementation of the transceiver, although he was looking at a four transceiver implementation.

Mr Brian Lemoff asked whether he could see an advantage over serial 10G. Mr Bhatt replied that for today's technology WDM was more feasible.

### 10G-BASE-T - Mr Jamie Kardontchik

Mr Kardontchik's presentation described a proposal for a 10G-transmission scheme that was based on the 1000BASE-T signalling scheme. His 10G architecture included four channels of PAM-5 signalling with each channel being launched at a different wavelength down a single fibre. He discussed the signal to noise ratio of the system and the coding gain. He then went on to look at wave shaping, differential skew and scrambling issues. He concluded his presentation by comparing the SNR of several different systems.

Mr Rich Taborek pointed out that as well as dispersion skew there was also skew due to different wavelengths. He asked which one was more dominant. Mr Kadontchik replied that that there was more phase delay than group delay and that the group delay was flat.

### 10G BASE-SX - Mr Brian Peters

Mr Peter's presentation proposed a low cost eight channel 850nm VCSEL solution for 10GbE. Mr Peters described the electronics for the system and then explained the benefits and limitations of his proposal.

Mr Peters was asked whether the VCSELs were in arrays or discrete. He replied that they were currently discrete devices but that they were looking into arrays.

Mr Peters was asked about the de-skew function. He replied that the de-skew resided on the electrical side to re-align the signals.

Mr Peters was asked what the power budget for the system was. He replied that there was a 6dB insertion loss.

### WWDM transceiver Module for 10-Gb/s - Mr Brian Lemoff

Mr Lemoff's presentation described an implementation for a WWDM transceiver. He started by describing the advantages of WWDM and the choice of 1300nm. He then went on to describe the proposal and the transmitter optical subassembly. He displayed several slides showing the manufactured assembly. He then described the receiver subassembly and the operation of the wavelength de-multiplexor. He again showed photographs of an example device. Mr Lemoff then went on to discuss the integrated circuits in the transceiver and displayed some eye diagrams for the transmit and receive channels. He concluded by showing a photograph of a complete module.

During the presentation Mr Lemoff clarified that there was a 2-3dB insertion loss for the de-multiplexor and that the mould was polished so the plastic parts did not require polishing.

Mr Steve Swanson asked whether the single mode fibre stub from the transmitter to the front of the housing was offset or whether an offset patch cord was required. Mr Lemoff replied that this would be up to the committee to decide, but that a patch cord was not required for the majority of fibre. Mr Lemoff was then asked if the same patch cords as those used for gigabit Ethernet could be used. He replied that the same ones as used for LX applications could be used for WWDM applications.

Mr Lemoff was asked whether any degradation of plastic parts was seen. He replied that there might be a couple of dB loss due to humidity.

Mr Lemoff was asked whether he had looked at the reliability impact of using four laser sources as opposed to one. He replied that he thought that customers would expect the

same reliability as Gigabit Ethernet transceivers so the reliability of the sources would have to increase by a factor of four.

Mr Bob Grow asked whether the technology would be licensed on 802 terms. Dan Rausch replied that there may be some intellectual property in their implementation but that other companies could choose to implement in a different way. He stated that if there was some IP which was required for the standard than they would licence it on the normal basis.

### DFB Laser Source Study - Ms Lisa Buckman

Ms Buckman's presentation described a performance study of the WWDM transceivers described in Mr Lemoff's presentation. She started by describing the power penalty due to RIN. She then described the experimental set-up and explained the results. She displayed several eye diagrams and charts for BER results and RIN results.

Ms Buckman was asked whether she was planning to repeat the tests over multi-mode fibre. She replied that she was.

### 10G/s Multimode Fibre System Update - Mr Paul Kolesar

Mr Kolesar's presentation described a new multi-mode fibre, which was suitable for use at speeds from 10Mbps to 10Gbps. He described the advantages of the fibre and explained that there was activity in the cabling standards area to standardise the new MMF. He then went on to describe the test set-up used to compare traditional MMF to the new MMF and then showed the results from the comparison.

During questions after the presentation Mr Kolesar clarified that the length of the fibre used was 300m and that the wavelength spread was for which this performance was seen was 100nm.

Mr Del Hanson pointed out that a -18dBm sensitivity was pushing the limits of today's technology. Mr Kolesar replied that this was correct, but that another company offered a similar performance device.

### Serial Optical PMD proposal - Mr Ed Cornejo

Mr Cornejo's presentation proposed a structure for the 10GbE encoders, decoders and transceivers. He then proposed preliminary 2km and 15km specifications for the transceivers. He concluded his presentation by examining the options for the optical PMD.

Mr Del Hanson asked whether the -14dBm receiver sensitivity was a production limit with margins. Mr Cornejo replied that it was.

### 10G serialisation - Mr Fred Weniger

Mr Weniger proposed two 'GMII like' interfaces for 10GbE and explained that both were technically feasible.

### Serial 10Gbit/s Transceiver Link Performance Analysis - Mr Piers Dawe

Mr Dawe's presentation examined the issues for 10GbE optical links. He compared the GbE specification to an equivalent SONET system. He then went on to look at the different elements of an optical link and how impairments are introduced. He went on to look at reach versus line rate and gave some example eye diagrams for different link lengths. He concluded by looking at high speed silicon ICs operating at lower voltages.

After this presentation the meeting then closed for the day.

**THURSDAY 3 JUNE**

**ADMINISTRATIVE MATTERS**

Mr Jonathan Thatcher re-convened the IEEE 802.3 HSSG at 0840. The attendance lists were circulated.

**Fibre Survey AdHoc**

Mr Bruce Tolley reviewed the outcome of the Fibre survey AdHoc meeting. They are in the process of preparing a survey. He requested people in the room to help by providing information on the installed base in any way possible.

**Action:** HSSG Chair - Place item 'Report from Fibre Survey' on September Agenda.
**Action:** Mr David Law - Configure a reflector for Fibre survey AdHoc.

**Request for Copper PHY AdHoc**

Mr Chris DiMinico requested an AdHoc be formed on the subject of Copper PHYs. He stated that there would be no restriction on the type of copper considered.

Mr Jonathan Thatcher agreed and stated that the AdHoc should start today and finish prior to the July plenary. Their objective should be to provide a presentations for July Plenary. In addition he appointed Chris DiMinico to chair the AdHoc. The Formation of the Copper AdHoc was approved by acclimation.

**Review of 802.3z Schedule and Objectives.**

Mr Jonathan Thatcher reviewed the 802.3z timeline from March 98. Mr Geoff Thompson stated that the 802.3z timeline was an aggressive schedule. He said that we knew this at the time and that the number of decisions we had to make for both 100Mb/s, and 1000Mb/s, were small. We had external developed PHY technology that we had few changes to make to. The standards process largely determined the schedule. In this case we have a large number of decisions. We need to achieve consensus on these decisions and this is not a zero time process. He therefore expects 10Gb/s to take longer.

Mr Jonathan Thatcher then went on to review the November 1996 IEEE 802.3z objectives. He stated that objectives should set the limits and guide us. In the case of 802.3z there were modifications to the objectives during the project, but they were very minor. After they were set most discussions of the objectives were related to interpretation.

He went on to state there were two major points, we will be referring back to these objectives throughout the project and that if something comes up that it is outside the objectives, it will be generally ruled out of order. The objectives will also drive the work and the timescales. Basically these are really important as these define the work for the next couple of years.

Mr Geoff Thompson agreed with Jonathan. He also stated that we don't have to have a finished set of objectives by lunchtime. We should do the easy ones today and the ones that need more work can be left open, crisply define what is needed to close them and move forward. It is possible to change objectives but it is difficult. We do things by 75% voting in here so we have a lot of hysteresis.

**Motions**

Mr Jonathan Thatcher reviewed the list of motions that had already been requested. These were: Bruce Tolley – 'HSSG Chair', Rich Taborek – 'T11.2', Bob Grow – 'Objectives', Shimon Muller – 'Transmission schemes', Paul Bottorff – 'MAC/PLS Data Rate'.

Mr Rich Taborek asked if we needed to consider Auto-Negotiation as an objective, it was not on 802.3z list. Mr Roy Bynum asked if we could have an objective to go into the WAN. Mr Jonathan Thatcher stated that since we have no objectives at this point we could not add to them. We should revisit these prior to closing the objectives motions.

**HSSG Chair motion**

Mr Bruce Tolley came up to present his motion. He connected his PC to the LCD projector a which point his PC produced the blue screen of death. Amidst laughter, some quipped that "this is a bad omen." Instead, he made his motion verbally.

## *Motion:*

Confirm by acclimation Mr Jonathan Thatcher as the chair of the Higher Speed study group

Move: Bruce Tolley
Second: Chris DiMinico

PASSED by Acclimation

**T11.2 Motion**

## *Procedural Motion*

The IEEE HSSG endorses the initiative by members of NCITS Task Group T11.2 (Fibre Channel Physical Layer) to raise the status of that group to an NCITS Technical Committee.

Benefit to HSSG: The direct benefit of this initiative includes the ability of the new TC to address sub-tasks associated with the development of 10 GbE standards expeditiously.

Background: T11.2 currently includes semi-permanent Ad Hoc groups addressing Optical, Copper and Jitter issues.

Move: Rich Taborek,
Second: Schelto van Doorn

Motion withdrawn.

Mr Jonathan Thatcher asked for a ruling from 802.3 Chair if the HSSG has the authority to make such a motion. Mr Geoff Thompson replied that he has been open on

liaisons in the past as they have generally been Technical in nature. In this case however, he was concerned that the requested liaison is politically delicate and therefore protocol needed to be observed. The motion is therefore not total in order, as procedurally external liaisons have to be approved by the 802 executive.

After some further discussion Mr Jonathan Thatcher request that the motion either be withdraw, re-drafted with the help of Mr Geoff Thompson or taken through the appropriate channels.

The motion was withdrawn as recorded above.

**Objectives Motion**

***TECHNICAL MOTION:***

Adopt as objectives for the Higher Speed Study Group:

(1) Preserve the 802.3/Ethernet frame format at the MAC Client service interface
(2) Meet 802 Functional Requirements, with the possible exception of Hamming Distance
(3) Preserve minimum and maximum FrameSize of current 802.3 Std
(4) Specify an optional Media Independent Interface or interfaces
(5) Support full-duplex operation only
(6) Support operation at the MAC/PLS service interface at speeds of:
    a. 10,000 Mb/s in the local area environment
    b. ~10,000 Mb/s in the metropolitan area environment
(7) Support star-wired local area topologies
(8) Support media selected from ISO/IEC 11801
(9) Provide a family of Physical Layer specifications which support a link distance of:
    a. At least 200m on multimode fiber
    b. At least 3 km on single mode fiber

Moved: Bob Grow
Seconded: Shimon Muller

Motion divided on each main objective

Mr Jonathan Thatcher reviewed the process to be used during this motion. Each proposed objective would be reviewed. A Straw poll would then be taken. If it was clear that we are going to get 75% approval we will proceed to vote. If however it is obvious that a particular objective is going to cause a lot of contention the motion will be split.

Mr Roy Bynum raised a Point of order, he requested that HSSG voting rules be reviewed. Mr Jonathan Thatcher stated that anyone present at the time the vote is taken has the right to vote, subject only to the provision that they believe that they are qualified to vote on the matter before the Study Group.

Mr Bob Grow reviewed his proposed objectives. He stated that several other companies have reviewed them and that there was general, although not total agreement, with them. The objectives as based on those of 802.3z. There is no long haul objective since the

charter for 802.3 is LAN/MAN, however these objectives are not meant to preclude long haul.

**Objective 1 Review**

Mr Bob Grow stated that this was to preserve the 802.3/Ethernet frame format at the MAC Client service interface as defined in the current standard which is the IEEE 802.3 1998 edition plus IEEE 802.3ac-1998. An additional objective may be required to include 802.3ad.

Mr Paul Bottorff: asked if this was preservation of the MAC/Client Services interface or the frame format at the MAC/Cline service interface. Mr Bob Grow answered that it was yes to both.

**Objective 2 Review**

Mr Jonathan Thatcher stated that this was verbatim from 802.3z. Mr Geoff Thompson stated that this was an exception for 100BASE-T as hamming distance only really applies to bit-for-bit encoding, 100BASE-T uses block encoding. He request that this objective only be a draft one until everyone has had time to review the 802 FR (Function Requirements). There was some discussion about the validity of the current 802 FR document but it was concluded that this was currently the correct document.

**Objective 3 Review**

Mr Bob Grow stated that this was also identical to 802.3z and that we should not do something in the 10G standard that may actually apply to all speeds. Any frame size change would be more appropriate to a separate study group.

Mr Jonathan Thatcher stated that he interprets it that if we include something about frame size in this project, it would apply only to 10G with all the inherent problems this would have for inter-working of different speeds.

**Objective 4 Review**

Mr Bob Grow reviewed objective 4. The 802.3z equivalent was a late addition to their objectives. Having seen the benefit at 100Mb/s and 1000Mb/s we should do it for 10,000Mb/s.

Mr Walter Thirion asked what does the word ‘interfaces’ imply. Is this the interface between the MAC and PHY. Mr Shimon Muller replied that there might be space for more than one interface.

Mr David Law asked if this was proposing multiple interfaces as the same point in the sublayer stack. Mr Bob Grow stated that one interface would be at the same point as the MII. Others interfaces would be below that point.

Mr Dan Dove asked for a clarification if objectives are exclusionary. If SMI is not stated, can we still work on it? Mr Jonathan Thatcher stated that if the SMI is required to meet the overall objective then it could be done. Mr Geoff Thompson pointed out that in the past we have also had non-objectives. This may be a worthwhile mechanism.

Mr Jonathan Thatcher offered the interpretation that if there is an interface to the media that is not media independent it will become a media specific interface and is not included here. Mr Bob Grow agreed with this interpretation.

**Objective 5 Review**

Mr Bob Grow stated that there seems to be no arguments on this one. There wasn’t.

**Objective 6 Review**

Mr Bob Grow reviewed objective 6. He stated that speed was on the top of the 802.3z objectives. It may be more of an issue here due to Metro area links. The objective may also be considered exclusionary, as it fixes the speed. The objective is however, to do the next generation of Ethernet.

Mr Paul Bottorff asked for a clarification if speed was clock rate or data rate. Mr Bob Grow replied that speed has always meant MAC data rate.

Mr Chris DiMinico asked if this was precluding the support of fault tolerance in PHY. Mr Bob Grow replied it did not.

Mr Paul Kolesar stated that he was concern that specifying two separate speeds has the potential for increasing the complexity of systems. Do you want two speeds or provision for two speeds. Mr Bob Grow stated that he wished the latter, the provision for two speeds. After some more questions Mr Bob Grow stated that the boundary was being crossed between clarification and debate.

Mr Howard Frazier stated that he saw a disconnect between objectives 6 and 9. Objective 6b provides for WAN speed support yet 9 does not provide WAN distance support. Mr Bob Grow replied that as they could not agree on an item 9c and 9d to support a WAN distance so it was left off.

**Objective 7 Review**

Mr Geoff Thompson requested what this means in relation to full duplex. Mr Bob Grow stated that it means supporting the building-wiring standard.

**Objective 8 Review**

This was deferred until later.

At this point Mr Jonathan Thatcher asked if anybody objected to splitting the motion. There were no objections. He then proposing taking the first three objectives as a group and asked if anybody in the room has issues with 1, 2 or 3. There were objections on all. The motion was then split into individual motions on each objective.

Mr Walter Thirion asked if objectives can be added later and how do we know when the process is finished. Mr Jonathan Thatcher replied that there will be a motion to close the objectives latter but objectives can be added by vote at any time, even after that point.

**Objective 1 Motion (part of divided Objectives motion)**

***TECHNICAL MOTION***

Adopt as objectives for the Higher Speed Study Group:

Preserve the 802.3/Ethernet frame format at the MAC Client service interface.

Move: Bob Grow
Second: Shimon Muller

PASSED by acclimation

Break at 10:20 a.m.

Meeting re-convened at 10:42 a.m.

Mr Geoff Thompson proposed a friendly amendment to change ‘at the MAC’ to read ‘and the MAC’. This was not accept this as a friendly amendment

Mr Walter Thirion requested the mover and seconder to explicitly state the intent of the motion. Mr Shimon Muller stated that if you go to 802.3z it was preserve the frame at the MAC/Client interface. He said that he sees no need to change the MAC/Client interface in this case but if that needs to be done, it should be added as another objective.

Mr Dan Dove proposed a friendly amendment to strike the ‘s’ in objectives. This was not accepted as a friendly amendment as the ‘s’ was in the text of the original motion that was divided.

Mr Paul Bottorff stated that he agree with the intention, however he had the concern that we may want to have the option of changing the MAC/Client interface if required.

Mr Kevin Daines called the question. There was no objection to calling the question. The motion passed by acclimation as recorded above.

**Objective 2 Motion (part of divided Objectives motion)**

***TECHNICAL MOTION***

Adopt as objectives for the Higher Speed Study Group:

Meet 802 Functional Requirements, with the possible exception of Hamming Distance

Move: Bob Grow
Second: Shimon Muller

Y: 63 N: 2 A: 16 Motion PASSED

Mr Rich Taborek proposed a friendly amendment to strike the ‘with the exception of Hamming Distance’. Mr Bob Grow stated that from past 802.3 experience he did not consider this a friendly amendment. Mr Rich Taborek then proposed it as a motion to amend. There was no second so the motion to amend failed.

Mr Jonathan Thatcher called the question. There was no objection to calling the question. A voice vote taken, there was one objection. A vote was taken, the motion passed as recorded above.

**Objective 3 Motion (part of divided Objectives motion)**

***TECHNICAL MOTION***

Adopt as objectives for the Higher Speed Study Group:
Preserve minimum and maximum FrameSize of current 802.3 Std

Move: Bob Grow
Second: Shimon Muller

PASSED by acclimation.

Mr Walter Thirion asked if this objective is necessary since we have already have an objective to preserve the frame format. Mr Shimon replied that some interpret the frame format not to include the data size.

A friendly amendment was proposed to change 'preserved' to 'support'. This was not considered a friendly amendment.

A voice vote was taken and the motion was passed by acclimation as recorded above.

**Objective 5 Motion (part of divided Objectives motion)**

***TECHNICAL MOTION***

Adopt as objectives for the Higher Speed Study Group:
Support full-duplex operation only

Move: Bob Grow
Second: Shimon Muller

PASSED by acclimation.

There was no discussion of this motion. A voice vote was taken and the motion was passed by acclimation as recorded above.

**Objective 7 Motion (part of divided Objectives motion)**

***TECHNICAL MOTION***

Adopt as objectives for the Higher Speed Study Group:
Support star-wired local area topologies.

Move: Bob Grow
Second: Shimon Muller

Mr Geoff Thompson noted that traditionally these statements are meant as a contrast to a ring and bus but since we are full duplex only he was not sure what this means. Mr Howard Frazier replied that this is required as you can use full duplex to build a ring. It prevents requests for support for features to support a ring access protocol.

Mr Jonathan Thatcher requested a clarification from the mover and seconder, did they believe this to be exclusionary to other potential topologies. Both Mr Bob Grow and Mr Shimon Muller replied no.

Mr Dan Dove proposed a friendly amendment to change the motion to read:

Adopt as objectives for the Higher Speed Study Group:

Support star-wired local area networks using point-to-point links and structured cabling topologies.

Y: 55 N: 11 A: 17 PASSED

This amendment was accepted as friendly

Mr Walter Thirion called the question; there was an objection to calling the question. Mr Rob Marsland seconded calling the question.

A vote on calling the question passed Y: 45 N: 9

The vote on the amended motion passed as recorded above

**Objective 8 Motion (part of divided Objectives motion)**

***TECHNICAL MOTION***

Adopt as objectives for the Higher Speed Study Group:

Support media selected from ISO/IEC 11801

Move: Bob Grow
Second: Shimon Muller

Y: 18 N: 38 A: 16 FAILED

Mr Chris DiMinico proposed a friendly amendment to state specifically cooper and fibre and to capture the new version of 11801. This was not considered this friendly. Mr Chris DiMinico made a motion to amend.

***MOTION TO AMEND:***

Amend the motion to read:

Adopt as objectives for the Higher Speed Study Group:

Support fiber and copper media selected from ISO/IEC 11801-A.

Move: Chris DiMinico
Second: Len Young

During discussion Mr Jonathan Thatcher stated that he believed that the original motion was exclusionary. Mr Bob Grow replied that without the amendment the motion was

identical to the similar objective in 802.3z, that we did utilise media in 802.3z that were not from 11801 and that the motion was therefore not totally exclusionary.

Mr Geoff Thompson stated that if we went to ballot with Fibre and something similar to 1000BASE-CX he would have to vote no as we would have failed to meet the objectives. He then went on to propose the friendly amendment to the amendment. The amendment as modified reads:

Adopt as objectives for the Higher Speed Study Group:

Support fiber media selected from ISO/IEC 11801-A and copper media.

The Mover and Second of the amendment accepted this as friendly

After some further discussion Mr Brian Lemoff proposed adding, as a friendly amendment to the amendment, the words 'if possible' prior to copper to allow the standard to go forward if a copper solution is not found in time. The amendment as modified reads:

Adopt as objectives for the Higher Speed Study Group:

Support fiber media selected from ISO/IEC 11801-A and, if possible, copper media.

Y: 31 N: 43 A: 5 FAILED

The Mover and Second of the amendment accepted this as friendly

Mr Hon Wah Chin called the question; there was an objection to calling the question. Mr Jim Welch seconded calling the question.

A vote on calling the question passed Y: 59 N: 5

The vote on amendment failed as recorded above.

The discussion returned to the original motion in relation to it being exclusionary. In a reply to a question of clarification Mr Bob Grow stated that this objective does not exclude use of other media, if however another media is suggested he will require justification why we cannot us something similar from 11801.

Mr Tom Dineen called the question; there was an objection to calling the question. Mr Bob Grow seconded calling the question.

A vote to call the question passed Y: 59 N: 3 A: 5

The Vote on the motion failed as recorded above.

Mr Jonathan Thatcher request that a AdHoc be set up with the objective of drafting an acceptable alternative objective 8 with a supporting presentation.

Mr Geoff Thompson stated that all SC25/WG3 delegates should participate in this AdHoc.

Mr Jonathan Thatcher appointed Geoff Thompson as chair of the Objective 8 Ad-hoc

**Action:** 'Media AdHoc': Draft acceptable alternative Objective 8 with supporting presentation.

**Action:** Mr Jonathan Thatcher: Place time on July agenda for report from 'Media' Ad-hoc

***PROCEDURAL MOTION:***

Move to postpone until after straw polls are complete.

Move: Walter Thirion
Second: Roy Bynum

Y: 65 N: 3 A: 4 PASSED

There was some discussion if this was appropriate as the meeting was scheduled to run for three days and this seemed an attempt to finish early.

Mr Juan Jover called the question. There were no objections to calling the question. The motion to postpone passed as recorded above.

**Objectives 4, 6 and 9 Straw Poll**

***STRAW POLL:***

Do you support objectives 4, 6 and 9 as written:

Objective 4
Specify an optional Media Independent Interface or Interfaces

Y: 57 N: 2

Objective 6
Support operation at the MAC/PLS service interface at speeds of:

a. 10,000Mb/s in the local area environment
b. ~ 10,000 Mb/s in the metropolitan area environment

Y: 12 N: 35

Objective 9
Provide a family of Physical Layer specification which support a link distance of:

a. At least 200m on multimode fibre
b. At least 3 km on single mode fibre

Y: 12 N: 36

Now that the Straw poll is complete the previous motion is back on the table

The meeting Adjourned for lunch at 12:18

The meeting re-convened at 13:46

**Objective 4 Motion (part of divided Objectives motion)**

***TECHNICAL MOTION***

Adopt as objectives for the Higher Speed Study Group:
Specify an optional Media Independent Interface or Interfaces

Move: Bob Grow
Second: Shimon Muller

There was a discussion as to where the interface referred to would be placed in the sublayer stack, if it would be where the current MII/GMII was or if it would be elsewhere. It was concluded that the intent was to allow multiple interfaces and not to preclude it being placed elsewhere in the stack.

Mr Geoff Thompson stated that reading this legalistically it refers to the 100Mb/s 'Media Independent Interface'. He proposed a friendly amendment to not capitalise 'Media Independent Interface' and to add the text 'between PCS and RS'. The first part of this amendment was considered friendly, the second part not. He withdrew the second part of his amendment, the first part was accepted as friendly. The monition, as amended, now reads:

Adopt as objectives for the Higher Speed Study Group:
Specify an optional media independent interface or interfaces

Mr Brad Booth said that he had issues with 'or interfaces' and that there should only be one. He proposed a friendly amendment to strike the words 'or interfaces'. This was not considered a friendly amendment, so it was moved as a motion to amend. The motion, amend reads:

***MOTION TO AMEND:***

Adopt as objectives for the Higher Speed Study Group:
Specify an optional media independent interface.

Move: Brad Booth
Second: Dan Dove

Vote on amendment: Y: 33 N: 8 A: 8 PASSED

Vote on motion as amended: Y: 52 N: 0 A: 6 PASSED

There was more discussion with the clarification given that the original motion was intended to allow more that one interface at different places in the stack and did not mandate the use of the existing MII nor GMII. The question was called. There were no objections to calling the question. The amendment passed as recorded above. The amended motion also passed as recorded above.

***PROCEDURAL MOTION:***

Move to postpone consideration of objectives 6 and 9 until the July meeting.

Move: Bob Grow
Second: Ed Cornejo

There was a discussion if this would be a good idea. There was the suggestion that postponing would allow more time to think about the issues but there was also the suggestion that we should at least start the discussions at this meeting. Mr Rich Taborek requested this motion to be withdrawn. Instead he proposed a motion to allow limited time discussion on these two objectives.

***PROCEDURAL MOTION:***

Move to have a time limited discussion of the next two motionof 30 minutes each.

Move: Rich Taborek
Second: Tom Dineen

PASSED by acclimation

**Objectives 6 Motion (part of divided Objectives motion)**

***TECHNICAL MOTION:***

Adopt as objectives for the Higher Speed Study Group:
Support operation at the MAC/PLS service interface at speeds of:
a. 10,000Mb/s in the local area environment
b. ~ 10,000 Mb/s in the metropolitan area environment

Move: Bob Grow
Second: Shimon Muller

A discussion limited to 30 minutes commenced on the motion.

Mr Paul Bottorff proposed a friendly amendment to change ‘speed’ to ‘data rate’. This was accepted as a friendly amendment. The motion now reads:

Adopt as objectives for the Higher Speed Study Group:
Support operation at the MAC/PLS service interface at data rate of:
a. 10,000Mb/s in the local area environment
b. ~ 10,000 Mb/s in the metropolitan area environment

Motion POSTPONED to July HSSG Agenda

Mr Paul Bottorff proposed a second friendly amendment to strike item (a). This was not accepted as a friendly amendment.

There was further discussion on the motion. Mr Tom Dineen supported the motion since it sets the LAN to 10,000 Mb/s yet allows MAN to approximately 10,000. Mr Piers Dawe said that we were now at a crossroads, up until now Datacommunications had been lagging behind Telecommunications in speed and had previous reuse existing optics. Taking existing Telecommunications equipment that operates at nearly 10G and trying to up it to operate at a 10G data rate may be the straw that breaks the camel's back. Mr Howard Frazier said that he believe we should have one rate. That should be 10Gb/s. In each generation of Ethernet we have had a clearly stated data rate and we have always done a x10 increase.

Mr Walter Thirion stated that it was not a discussion of 10 Gb/s or 9.6 Gb/s but rather are we going to have Ethernet or leverage OC-192. He then proposed a friendly amendment to strike item (b). As Mr Shimon Muller, the seconder of the motion, was not in room the amendment could not be declared friendly. It was modified to be a motion to amendment.

***MOTION TO AMEND:***

Strike item (b)

Move: Walter Thirion
Second: Dan Dove

Motion POSTPONED to July HSSG Agenda

During the discussion Mr Paul Bottorff stated that he did not want to have one rate fixed at the MAC/PLS, there were no hidden agendas, he just wanted to be able to leverage existing SONET technology

Mr Brian Lemoff proposed a friendly amendment to the proposed amendment, insert a '~' in item (a). This was not considered a friendly amendment, so it was moved as a motion to amend.

***MOTION TO AMEND:***

Insert a '~' in item (a).

Move: Brian Lemoff
Second: Vibha Goel

Y: 22 N: 21 A: 8 FAILED

Mr Shaun Rogers proposed a friendly amendment to the proposed amendment, add the words 'maximum' in front of 10,000. This was not considered a friendly amendment. A motion to postpone was then made.

***PROCEDURAL MOTION***

Move to postpone further consideration of this motion until the July HSSG. The HSSG chair is to use his discretion to select the appropriate point on the July agenda for consideration of this motion.

Move: Geoff Thompson
Second: Bob Grow

PASSED by acclimation.

Mr Bob Grow called the question; there was not opposition to calling the question. A voice vote was taken and the motion passed by acclimation as recorded above.

**Action:** Jonathan Thatcher - Add consideration of postponed Grow/Muller Objective 6 (Speed) motion to July agenda. The appropriate point on the July agenda for consideration of this motion is to be chosen at his discretion.

**Objectives 9 Motion (part of divided Objectives motion)**

The motion for Objective 9 was considered. Mr Shimon Muller withdrew his second for the motion, Mr Tom Dineen seconded instead.

***TECHNICAL MOTION:***

Adopt as objectives for the Higher Speed Study Group:

Provide a family of Physical Layer specifications which support a link distance of:

a. At least 200m on multimode fiber
b. At least 3 km on single mode fiber

Move: Bob Grow
Second: Tom Dineen

A discussion limited to 30 minutes commenced on the motion. Mr Shimon Muller proposed a friendly amendment, change 200 to 100. This was accepted as friendly. The motion now reads:

Adopt as objectives for the Higher Speed Study Group:

Provide a family of Physical Layer specifications which support a link distance of:

a. At least 100m on multimode fiber
b. At least 3 km on single mode fiber

Move: Bob Grow
Second: Tom Dineen

Mr Nader Vijeh propose a friendly amendment, change item (a) to read Building LANs, item (b) to read Campus LANs and add item (c) Metropolitan Area Networks. This was not considered a friendly amendment. It was moved as a motion to amend

***MOTION TO AMEND:***

> Change item (a) to read Building LANs, item (b) to read Campus LANs and add item (c) Metropolitan Area Networks
>
> Move: Nader Vijeh
> Second: Dan Dove

There was a discussion if amendment made the objective too open, or if it was a good idea to leave things open at the moment and actual define distance latter. There was also the suggestion that this amendment should actually be an additional stand alone objective.

Mr Geoff Thompson stated that it has some merit as a holding item until the next meeting. He offered a friendly amendment, add item (d) Access to Wide Area Networks. This was accepted as a friendly amendment. The motion to amend now reads:

> Change item (a) to read Building LANs, item (b) to read Campus LANs and add item (c) Metropolitan Area Networks and item (d) Access to Wide Area Networks.
>
> Y: 24 N: 20 A: 10 Amendment FAILS

There was a further discussion on the original motion. Mr Tad Szostak then offered a friendly amendment, to replace items (a) and (b) in the motion to amend with ‘structured wiring’. This was not considered a friendly amendment.

Mr Howard Frazier asked that the need to support multi-mode be given very careful consideration, as there was a great deal of time spent during the Gigabit standard development making it work.

Mr Walt Thirion called the question. There were no objections to calling the question. The motion to amend failed as recorded above.

There was a further short discussion as to what was actually meant by multi-mode and if the motion was intended to include the installed base. At this point a motion to postpone was made.

***PROCEDURAL MOTION***

> Move to postpone further consideration of this motion until the July HSSG. The HSSG chair is to use his discretion to select the appropriate point on the July agenda for consideration of this motion.
>
> Move: Geoff Thompson
> Second: Bob Grow
>
> PASSED by acclimation.

**Action:** Jonathan Thatcher - Add consideration of postponed Grow/Dineen Objective 9 (Distance) motion to July agenda. The appropriate point on the July agenda for consideration of this motion is to be chosen at his discretion.

The meeting broke at 15:36
The meeting reconvened at 15:48

**MAC/PLS Data Rate Motion**

***TECHNICAL MOTION:***

Support a data rate of 9.620928 Gb/s at the MAC/PLS service interface. This does not specify the MAC/PLS clock rate.

Moved: Paul Bottorff
Second: Zinan Chen

The chair declared this motion out of order, as it is virtually identical to a motion that was discussed earlier and failed.

**Transmission Schemes Motion**

Mr Shimon Muller stated that he had intended to make a motion that he believe was important for our work but as many people on both sides of the particular debate have left he felt it appropriate to wait until the next meeting. He was however requested to present the motion, which he did.

***TECHNICAL MOTION:***

Include the following objective. 'Provide specification for both the single-channel (serial) and multi-channel (L1 Link Aggregation) transmission based scheme'

Move: Shimon Muller
Second: Rich Taborek

POSPONED until July meeting

Mr Shimon Muller reviewed the motion. Link Aggregation is already being implemented at Layer 2 in 802.3ad and it now needs to be extended to Layer 1. Need to be able to scale in both width as well as speed.

Mr Geoff Thompson proposed a friendly amendment to change the word 'provide' to read 'consider'. This was not considered friendly.

***PROCEDURAL MOTION***

Move to postpone further consideration of this motion until the July HSSG. The HSSG chair is to use his discretion to select the appropriate point on the July agenda for consideration of this motion.

Move: Geoff Thompson
Second: Bob Grow

PASSED by acclimation.

**Action:** Jonathan Thatcher - Add consideration of postponed Muller/Taborek motion to July agenda. The appropriate point on the July agenda for consideration of this motion is to be chosen at his discretion.

**Ad Hoc formation**

At this point all the motions on the table have been consider. Mr Jonathan Thatcher proposed that two AdHoc groups should be set up to consider the two objectives motions that have been postponed to the July meeting.

**Speed Ad Hoc**

The HSSG chair appointed Walter Thirion as the chair of the speed ad hoc. Volunteers to work in the ad hoc were: Walter Thirion, Len Young, Paul Bottorff, David Martin, Rich Taborek, Piers Dawe, Del Hanson, Tom Dineen

**Action:** Walter Thirion – Send e-mail to HSSG reflector to invite further participants.
**Action:** David Law – Configure e-mail reflector and web page for this AdHoc
**Action:** AdHoc – Recommend new speed objective and provide backup presentation material as necessary.

**Media/Distance Ad Hoc**

The HSSG chair appointed Del Hanson as the chair of the objective 9 (distance) AdHoc. Volunteers to work in the ad hoc were: Bob Grow, Tom Dineen, Paul Bottorff, David Martin, Rich Taborek, Del Hanson, Tad Szostak, Steve Swanson, Len Young, Giorgio Giaretta, Dan Dove, Chris DiMinico, Vipal Bhatt, John Ewen, Shelto van Doorn, Ken Herrity, Fred Weniger, Brian Lemoff, Lisa Buckman, Jonathan Thatcher.

**Action:** Del Hanson – Send e-mail to HSSG reflector to invite further participants.
**Action:** David Law – Configure e-mail reflector and web page for the AdHoc
**Action:** AdHoc – Recommend new media/distance objective and provide backup presentation material as necessary.

**Issues List**

Mr Jonathan Thatcher review a list of issues he had gathered from the e-mail reflector in the last few weeks. He listed them and invited contributions from the audience.

**Action:** Jonathan Thatcher - Send e-mail to the HSSG reflector listing the following issues and, where appropriate, the persons with actions to provide presentation.

<u>Issue 1 – Raw requirements for access to Wide Area Networks</u>
**Action**: Paul Bottorff to provide presentation on this issue at the July meeting

Issue 2 –Encoding schemes - Implications of FEC, bit error multiplication

**Action:** Paul Bottorff to provide presentation on this issue in relation to scrambling at the July meeting

**Action:** Kamran Azadet to provide presentation on Error Correction.

**Action:** Jonathan Thatcher – Arrange for Al Widmer to provide a presentation on 8B/10B coding and FEC at July meeting

Issues 3 – Bit Error Rate

The assumption will be that this is $10^{-12}$. If someone wishes to challenge this they should bring a presentation to the next meeting providing detailed reasoning why this needs to change.

Issues 4 – Jitter

While it is not necessarily something that needs presentations on in July its time to start thinking about Jitter.

Issue 5 – Support for 802.3 Standards currently in progress

**Action**: Geoff Thompson to provide a proposal on this issue.

Issue 6 - Not supporting CSMA/CD

**Action**: Jonathan Thatcher to draft the response to this item in relation to the 5 criteria.

Issue 7 – Support for Installed cable

No presentations were offered.

Mr Jonathan Thatcher reviewed the objectives for the next HSSG meeting in July. These included closing the objectives, competing a draft PAR, 5 Criteria and a more detailed list of changes required to the document and preparations for the York meeting at the end of September.

**Adoption of the March 10G Call for Interest minutes.**

Mr Jonathan Thatcher requested that his company name be correct to read ‘Picolight'.

***PROCEDURAL MOTION***

Adopt the March 1999 10G Call for Interest meeting minutes

Move: Tom Dineen
Second: Bob Grow
PASSED by acclimation

Mr. Thatcher thanked all for their participation and without objection the meeting adjourned.

Respectfully submitted 27 June 1999
David Law
Edward Turner