Telecommunications Industries Association
Standards and Technology Department

Engineering Committee FO-2, Committee on Optical Communication Systems
and
Engineering Committee FO-6, Committee on Fiber Optics
Meeting Report

FO-2 Chair: Felix Kapron
FO-6 Chair: Steve Swanson
Secretary and EDC: Bob Jensen

January 21-23, 2002
Sheraton Kauai Resort
Kauai, HI

Table of Contents

1 ADMINISTRATIVE

1.1 Call, to order

The opening plenary meeting was called to order on January 21, 2002 at 8:00 AM by FO-6 Chair, Steve Swanson. This plenary session is intended for high-level liaison reports, to update members of committee meeting expectations, and to inform them of administrative essentials.

The closing plenary meeting was called to order at 2:00 PM on January 23, 2002 by FO-6 Chair, Steve Swanson. This plenary session is intended to summarize meeting activities and resolve issues that may have come up over the duration of the meetings.

1.2 Attendance (quorum, introductions and roster)

A total of 24 attendees, including 8 voting members (or their representatives) and 16 others were present. A quorum for the combined Engineering Committees was established. The attendees introduced themselves and an attendance roster was distributed for participants to sign. Attendance at the closing plenary shall constitute FO-2&6 membership and quorum.

Chairs:

				Plenary	
				Opening	Closing
Felix Kapron	Corning, Inc.	kapronfp@corning.com	607-974-7156	√	√
Steven Swanson	Corning, Inc.	swansonse@corning.com	607-974-4252	√	√

Voting members companies present:

Jack Dupre	Agilent Technologies	jack_dupre@Agilent.com	707-636-9001	√	√
Tom Hanson	Corning Inc.	hansonta@corning.com	607-974-4530	√	√
James Matthews III	Corning, Inc.	matthewsje@corning.com	607-974-7608	√	√
Rex Craig	NIST	rcraig@boulder.nist.gov	303-497-3359	√	√
Gair Brown	NSWCDD	browngd@nswc.navy.mil	540-653-1579	√	√
Osman Gebizlioglu	Telcordia Technologies	ogebizli@telcordia.com	973-829-4956	√	√
Dennis Horwitz	Tempo	dennis.horwitz@rifocs.com	805-389-9868	√	√

Voting members companies absent:

Dave Roland	Alcatel	dave.roland@cable.alcatel.com	828-459-8775		
Arthur Hudson	Defense Supply Center	arthur_hudson@dscc.dla.mil	614-692-0657		
Barry Cambeilh	Delphi Comm.				
Kenneth Bow	Dow Chemical	kebow@dow.com	989-638-3759	√	
Andre Girard	EXFO	andre.girard@exfo.com	418-683-0211		
Frank Dundek	Panduit Corp.	fjdu@panduit.com	708-532-1800		
Ken Marchman	Stratos Lightwave	kmarchman@stratoslightwave.com	708-867-9600		

Other participants

Doug Atwill	ADC	doug-atwill@adc.com	952-233-7056	√	√
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Ken Biholar	Alcatel USA	ken.biholar@alcatel.com	972-477-9148	√	
Laura Adams	BigBear Networks	ladams@bigbearnetworks.com	608-434-3402	√	
Jerry Shrimpton	CIENA	shrimpton@worldnet.att.net	303-674-0981	√	
Susan Grant	Corning, Inc.	susan.grant@corning.com	828-901-2457	√	
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Rob Johnson	Corning Inc.	johnsonr@corning.com	607-974-7359	√	
Ed Kelly	Corning, Inc.	edward.kelly6@gte.net	717-730-2026	√	
James Luther	Corning, Inc.	james.luther@corning.com	828-901-6519	√	√
Greg Smith	Corning Inc.	smithge@corning.com	607-974-7134		√
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Casey Shaar	NetTest	casey.shaar@nettest.com	503-526-4684	√	√

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Thomas Ball	OFS Fitel	teballzz@aol.com	717-939-8537	√	√
Allen Cherin	OFS Fitel	cherin@lucent.com	770-798-2619	√	√
Paul Kolesar	OFS Fitel	pkolesar@lucent.com	732-949-1255	√	√
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John Struhar	OFS Fitel	jstruhar@lucent.com	770-798-3281	√	
John Smith	Pirelli	john.smith@us.pirelli.com	803-451-4028	√	√
Patrick Drexel	Prior Scientific	pdrexel@prior.com	310-517-8113	√	√
James Spencer	Siemens/Optisphere	jim spencer@optisphere.com	703-262-8349	√	
Robert Gallenberger	SPAWAR	gallenbr@spawar.navy.mil	619-553-3415	√	√
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Erich Rosenasd	Tempo	erich.rosenasd@rifocs.com	805-445-8733	√	√
Randy Manning	Tyco Electronics	randy.maning@tycoelectronics.com	717-486-5003	√	√
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Edward Trovato	US Navy	trevatoej@coronc.navy.mil	909-273-4754	√	
Stephen Martinek	Veeco Metrology	stevem@veeco.com	520-741-1044	√	√
Laszlo Szerenyi	WorldCom	laslo.szerenyi@wcom.com	727-346-0800	√	√
Robert Otto	Xanoptix	robert.otto@xanoptix.com	603-546-0613	√	√

F0-2/6 Company attendance history: This does not constitute the quorum list, as companies need to be members of TIA and meet quorum requirements of the TIA Engineering Manual.

Company	3 meetings	Jan-02	Jun-01	Jan-01	Jun-00
Agilent Technologies	1	1			
Alcatel	2	0	1	1	
Corning, Inc.	3	1	1	1	1
Defense Supply Center	2	0	1	1	1
Dow Chemical	1	0	0	1	1
EXFO	2	0	1	1	1
NIST	2	1	0	1	1
NSWCDD	2	1	1	0	1

Telcordia Technologies	2	1	1	0	1
Tempo	3	1	1	1	1

Note: Member companies absent from three consecutive meetings will be removed from the voting member list and placed on the nonvoting member list. Meeting attendance is taken directly from the attendance roster, so it is important that all attendees sign the roster. The Chair will notify a company of their failure to meet minimum participation requirements and request their attendance at future meetings; enforcement of the membership continuation rules is necessary in order to maintain our ability to raise a quorum at meetings.

1.3 Agenda review and approval

The agenda was reviewed and approved (FO-2&6/02-01-002).

1.4 Intellectual Property Rights statement

The chair brought to the attention of the membership the TIA policy regarding patents, the use of which may be essential to standards being considered. The full statement is contained in the 2001 edition of the TIA Engineering Manual.

1.5 Chair's report; general items; elections

At the opening plenary, Steve Swanson welcomed everyone to the meeting with a presentation (FO-2&6/02-01-003a) containing items to be discussed. TIA's Stephanie Montgomery conducted elections for FO-2 and FO-6 Chairs (item 1.4) after quorum was established at the opening plenary. Felix Kapron was elected FO-2 Chair and Steve Swanson was elected FO-6 Chair. Both were elected by acclamation. There were no candidates for either of the Vice-chair positions.

Steve explained that the purpose for the opening plenary is to optimize time in our schedule by reducing redundancy, to keep members informed of administrative items, and to offer all members the opportunity to hear high-level liaison reports relating to other pertinent organizations. Steve stressed that members should be using conference calls, the reflector, and the FTP site for meetings and distribution of documents. The intent is to be doing all standards business electronically by January 2003. The reflector has been setup so that e-mail to all of the FO Committees can be sent using the address of foall@tiacomm.org in addition to methods already set for e-mailing individual committees. Steve then introduced Bob Jensen, Fluke Networks, as the FO-2&6 Secretary and Electronic Document Coordinator (EDC). He explained that Bob would be holding an FTP site tutorial on Tuesday evening for members to learn about access and its use. Stephanie Montgomery provided an update to the members (item 1.6) and liaison reports of other pertinent organizations (item 0). Steve noted that this meeting is co-located with T1X1 and that future meeting plans should include co-locating with T1X1 a priority for TIA. Steve asked the members for their preference on a meeting place for June 2003, resulting in a consensus of Portland, OR. Steve, along with TIA, will work with T1X1 to coordinate this effort. On this Wednesday, a Receiver Symposium will be held.

1.6 TIA's report

Stephanie Montgomery and Susan Hoyler provided an update on TIA and on administrative issues. The Standards Development Organization (SDO) spin-off had slowed its progress after a public announcement of a blueprint for moving forward by ATIS and a reply from TIA. TIA is not recognized as a global organization under their current structure and, therefore, their documents not recognized by standards organizations such as IEC. FO-2&6 members are encouraged to use electronic means of

moving their work forward as costs are escalating for face-to-face meetings. The model for holding meetings is changing and should be solidified by March. Meeting facilities are being investigated to reduce costs. Some cost saving measures include having a contract with a hotel chain, locations being in airline hub cities, and using projectors that can be brought by individual companies. TIA stressed that all contributions need to have the copyright statement that is shown in Annex G of the TIA Engineering Manual. Templates in .DOC and .PPT formats are on the FO6MAIN FTP site in the WORKING\ADMINISTRATIVE folder.

1.7 Distribution and numbering of documents

Document #	Contributor	Company	Title
FO-2&6/02-01-001	Steve Swanson	Corning, Inc.	June 2001 Meeting Report (Portland, ME)
FO-2&6/02-01-002	Steve Swanson	Corning, Inc.	January 2002 Meeting Agenda (Kauai)
FO-2&6/02-01-003a	Steve Swanson	Corning, Inc.	Opening Plenary Presentation
FO-2&6/02-01-004	Tom Ball	OFS Fitel	IEC 86B Meeting Agenda (Liaison)
FO-2&6/02-01-005	Steve Swanson	Corning, Inc.	ISO SC25/WG3 Liaison
FO-2&6/02-01-006	Jerry Shrimpton	Ciena	ITU-T Q.16/15 Liaison
FO-2&6/02-01-007	Jim Matthews	Corning, Inc.	ITU-T Q.17/15 Liaison
FO-2&6/02-01-008	Rob Johnson	Corning, Inc.	Laser Safety Standards Liaison
FO-2&6/02-01-009	David Leight	DoD	DoD Report
FO-2&6/02-01-010	Tom Hanson	Corning, Inc.	86A Liaison Report
FO-2&6/02-01-011	Jim Matthews	Corning, Inc.	FO-2.7 Update Liaison

1.8 Meeting report review and approval

The June 2001 meeting report (FO-2&6/02-01-001) was reviewed at the closing plenary. Felix Kapron moved to accept the meeting minutes as written, with a second by Robert Johnson. The Engineering Committee unanimously approved the June 2001 meeting report.

2 OLD BUSINESS

2.1 Action item review

Previous action items were reviewed at this meeting and recorded by Steve Swanson.

2.2 Liaison reports

2.2.1 DoD, Gair Brown for Dave Leight (FO-2&6/02-01-009)

Sixteen balloted TIA documents were reviewed since the last TIA meeting in June. There have been no major issues of contention.

Fiber Optic Termini MIL-PRF-29504 and associated specification sheets /1 through /3, and /12 through /15 revisions are complete and have been forwarded for approval and publication. Spec sheets /1, /2, /12 and /13 have been designated “Inactive for New Design”.

Initial drafts of MIL-T-29504/4 and /5, pin and socket termini used in MIL-C-38999 electrical connectors are being sent for comments with a 45 day comment period. Numerous ferrule hole sizes are being added to the spec sheets and new qualified sources are anticipated to be added to the QPL after the revisions.

Initial drafts should be posted to the DSCC web site by February 1st.

Multichannel circular connector specification MIL-C-28876 and all specification sheets are in final draft stage. Documents should be sent for approval and publication by June 2002.

The Engineering Practice Study for MIL-C-83526 hermaphroditic connectors is complete. The study looked for ramifications to the cancellation of these connector specifications. Results of the study are such that the general specification will be retained and revised to meet requirements for the Army TFOCA II program. Specification sheets 12, 13, 14, and 15 will be designated "Inactive for new design". New slash sheets will be written to cover specific connector components for TFOCA II.

MIL-F-49291/1 fiber and MIL-C-85045/8 cable specifications are in final draft stage. These documents will support the Army TFOCA II cable.

MIL-PRF-24793A for UV Curable Adhesives has been dated Dec 27,2001.

The following is a discussion on the TIA-440 Terms and Definitions document.

The author of TIA-440 Terminology document needs direction from FO-6/FO-2 to proceed towards publication. The addendum and all DoD terms have been incorporated into the base document, and was previously balloted for 5 year validation. The time frame for publication lapsed and currently the document does not have ANSI accreditation. Therefore, we now have an opportunity to change how we use and coordinate this document. The last discussion within TIA concerning the future direction of the document was inconclusive. As previously discussed within TIA, there appears to be three alternatives as follows:

1. Ballot and publish the document as a TIA standard without ANSI accreditation.
2. Ballot and publish the document through TIA with ANSI accreditation.
3. Create a living document that would be posted on the TIA web site, and be available for use, review and update by all members. Author's note: If this method is chosen, the coordination process needs defined. Coordination of terms could be cumbersome without a balloting procedure. Two ideas come to mind:

a. Use a process where subcommittees or working groups are responsible for terms and definitions, and when a definition is deemed acceptable by the subcommittee or working group, then it would be considered as an acceptable definition. The new definition could be forwarded to the author, and the change posted on the TIA web site.

b. Use the squeaky wheel method, whereby, if a member, subcommittee or working group desires a change or addition, then they accept responsibility for the coordination and approval of that definition. Coordination could be as limited or extensive as deemed necessary. The new definition could be forwarded to the author, and the change posted on the TIA web site.

The author prefers the living document, squeaky wheel method of coordination. If this is acceptable, TIA would need to determine where the document would be posted on the web site and an easy procedure for updates.

2.2.2 ICEA, John Smith for Mike Kinard

2.2.3 IEC 86A, Tom Hanson (FO-2&6/02-01-010)

This report contains information on work in IEC SC86A and its working groups that relates to the work of SG6. The last meeting was in Florence, Italy from 18 Oct., 2001. The Chairman is Dr. G. Zeidler and

the Secretary is Mr. G. Perrot.

New publications
The fibre measurement documentation:

IEC 60793-1-30	Fibre proof test
IEC 60793-1-31	Tensile strength
IEC 60793-1-32	Coating strippability
IEC 60793-1-34	Fibre curl
IEC 60793-1-40	Attenuation
IEC 60793-1-41	Bandwidth
IEC 60793-1-42	Chromatic dispersion
IEC 60793-1-43	Numerical aperture
IEC 60793-1-44	Cut-off wavelength
IEC 60793-1-45	Mode field diameter
IEC 60793-1-46	Monitoring changes in optical transmittance
IEC 60793-1-47	Macrobending loss
IEC 60793-1-50	Damp heat
IEC 60793-1-51	Dry heat
IEC 60793-1-52	Change of temperature
IEC 60793-1-53	Water immersion

Note: The following dimensional measurements have status: BPUB (publication being printed):

IEC 60793-1-20	Glass geometry
IEC 60793-1-21	Coating geometry
IEC 60793-1-22	Fibre length

The optical fibre cable specifications:

60794-1-1	Optical fibre cables – Generic Specification

Note: The following specification has status: BPUB

60794-3, Ed. 3	Sectional Specification- Outdoor cables

The following Family Specifications in FDIS ballot stage should be closed by the time of the TIA meeting.
60794-3-10, for Outdoor cable – duct or directly buried cable
60794-3-20, self-supporting aerial telecommunication cables

Details
WG1: Fibre
WG1 agreed that a proposal for the improvement of 60793-1-41, Bandwidth should be further progressed. When the maintenance project is approved, the improvements will add the laser based (RML) launch and combine the measurement methods for A1, Glass multimode and A4, plastic multimode fibres.

Work is proceeding to create Technical Reports on the measurement of several nonlinear optics related attributes. These include Effective area, Non-linear coefficient, and Raman gain efficiency.

The PMD test method will be revised and elevated to a full test method (currently a Technical Report).

An OTDR guidance document will be produced for use in communicating with customers about the appearance of splices and the relevant aspects regarding splice loss.

An inter-fibre compatibility document is being considered.

We agreed to include a 100% hydrogen gas (vs. just 1%) testing option for the low-water peak fiber (G.652, Annex C). Since, according to the result of voting it was not possible to bring this improvement into the current document, this option is anticipated in the first revision to IEC 60793-2-50.

The microbending test is proceeding in the ballot process as a Technical Report.

We agreed to advance a project for a Differential Group Delay (DMD) test method for A1A (50 μ multimode fibre) for use in 10 Gbit/s Ethernet applications.

Both a guidance document and revised test method for nuclear radiation are proceeding in the ballot process.

We agreed to work toward a Technical Specification for environmental performance requirements on A1 (multimode) and B (single-mode) fibres. This could be incorporated into the next revisions of the Sectional Specifications, IEC 60793-2-10 and 60793-2-50.

WG3: Optical fibre cable
Work to define the requirements for patchcords and jumper cables has commenced and a new work ballot will be issued with text.

A joint project (SC86A and SC46C) on fire performance of communication cables in buildings was initiated.

The WG resolved the negative votes on the Indoor Cable Sectional Specification, IEC 60794-2, and its Family Specifications, 60794-2-xx. The issues revolved around the need for color codes. These issues have been resolved and new ballots are proceeding.

The Family Specification for underwater cables, IEC 60794-3-30 was advanced.

The new following tests were advanced:
- Sheave test
- Short circuit test
- Lightning test

Discussions about air blown installation and products designed for these installation techniques continues with some progress. The situation with patents has improved in that several companies have declared an intention to license. The declaration forms are not completed, because there is no particular Standard for reference. The scope of the IEC work has been proposed and agreed to be for the products related to blown installation techniques. It was also proposed and agreed that the installation procedures should be considered as within the domain of ITU-T SG6.

Beyond air blown installation, an installation guide for indoor cables is being considered to support JTC1/SC25.

2.2.4 IEC 86B, Tom Ball (FO-2&6/02-01-004) Tom gave an update with the agenda for the meetings to be held this week. Items to be discussed include CENELEC parallel voting (SMB/2187/INF) and the Status of the SC86B Secretariat.

2.2.5 IEC 86C, Felix Kapron Felix reported that IEC 86C last met in October in Florence, Italy. Work within IEC 86C is liaisoned with FO-2.1 and is detailed in their Subcommittee report.

2.2.6 IEC TC86, Ed Kelly The US delegation to the TC 86 Plenary had a successful meeting. Goals were met and the delegation was uniformly satisfied although a few issues were still out standing. The primary issue still open was the Question of Principle forwarded by SC86B prompted by their Working Group to recognize TIA committees as liaison "D" organizations.

The SMB, formerly the Committee of Action, rejected that request based on an evaluation of the TIA web site by C/A members. Their analysis suggested that TIA was a national organization that had as its primary mission national issues.

The Officers of TC 86 had to agree with the decision taken by the C/A but took the extraordinary step of asking the Plenary to empower the Officers to act when and if the TIA organization separated the Standards Development part of its organization which then could be dedicated to international as well as regional and national standards.

New Questions of Principle were sent to the SMB, which requested action on:

- Creation of a new PNWI Form, which would have both Internal PAS and Standards, included.
- Requested permission to change a PNWI to an Internal PAS if no comments are received and no negatives.

A new TC 86 Fiber Optic Web site was introduced WWW.iec.ch/tc86 along with a FTP site, which will be used by both Subcommittees and Working Groups in the TC 86 family. The site, ftp.iec.ch, is password protected for exclusive use by international participants. TAG members have the user passwords.

The IEEE new agreement for Double Logos in partnership with IEC was not completed in Florence but sources close to the subject believe the agreement is imminent.

TC 86 had a meeting with Sector Board 4 and proposed questions to determine level of support on some proposals. The questions were given the to the Future Watch group for consideration.

A proposal for new CD on either the work of TC 86 alone or in conjunction with Sector Board 4 was discussed. The plenary agreed to support a TC alone project if initiated.

2.2.7 IEEE 1222 and 1638, John Smith

2.2.8 IEEE 802.3, Paul Kolesar The IEEE 802.3 committee is working on two standards with relevance to optical fiber. IEEE 802.3ae is producing the 10Gb/s Ethernet standard and is presently in draft 4.0. Originally scheduled to complete in March, major issues with the test methods for serial interfaces will cause a delay of ratification until June at best. At issue are the measurements for jitter and

stressed receive sensitivity. The standard recognizes IEC types B1.1 and B1.3 (low water peak) SMF, as well as types A1b (62.5 µm) and A1a (50 µm) MMF including the new laser-optimized 50 µm fiber. The second activity is within IEEE 802.3ah regarding Ethernet in the First Mile (EFM). This project is selecting proposals for a first draft. They presently plan to support both a point-to-point as well as a point-to-multipoint architecture on SMF.

2.2.9 ISO/IEC JTC1 SC25/WG3, Steve Swanson (FO-2&6/02-01-005) Steve reported on the last meetings of ISO in Feldafing, Germany. Essentially, reported that the draft 11801 2nd edition was approved as FCD, the pathways and spaces draft ready for publishing, a new Multimedia copper cabling is proposed (CAT 8) for up to 1.2 GHz, the SOHO cabling is gaining momentum, and the new optical classes proposal has been adopted. The next meeting is February 25, 2002 in Japan and then in the US during August 2002.

2.2.10 ITU Q.15/15, Tom Hansen for Bill Gardner Numerous documents were published, including the new fiber Specifications. We are working toward Technical Specifications for environmental test requirements for both A1 and B fibers. We are working toward a Technical Specification for 10 Gig multimode fiber. Numerous measurements developments are underway in working group 1, including a DMD measurement method that is balloted as "PAS". In the cable group, there has been significant progress toward a patch cord specification that is in line with SC86B requests. In addition, the cable group has resolved many issues around blown installation products and a Famiily spec for this class of products will be balloted soon.

2.2.11 ITU Q.16/15, Jerry ShrimptonITU-T Study Group 15 at its October 2001 meeting consented to draft a new Rec. G.693 specifying very short reach interfaces for intra-office applications that may include passive optical devices such as photonic cross-connects. A new draft Recommendation specifying a wavelength grid with 20 nm channel spacing for Coarse Wavelength Division Multiplexing applications is progressing towards consent at the April-May 2002 meeting of SG 15. Q. 16/15 is also defining RZ line coding parameters for 40 Gb/s applications, leading to application specifications in a future version of Rec. G.959.1. Optical system design guidelines are being documented for publication as a Supplement to the G-Series Recommendations. Rec. G.664 is being revised to align with recent changes in IEC documents and to address safety aspects of Raman amplification.

2.2.12 ITU Q.17/15, Jim Matthews (FO-2&6/02-01-007)

Jim Matthews provided an update on ITU Q.17/15. The last meeting held was in Geneva Switzerland, October 2001. An •Experts Meeting is scheduled in Berne Switzerland Feb 8, 2002 (With Q16). The focus is presently on revisions to Recommendation G.671 to simplify tables, keep common requirements where values are universal, remove value requirements and point to specific recommendations, and review definitions for purposes of harmonization. Current liaisons are active with IEC SC86B on passive components, SC86C on active components and TC86 on dynamic components. New devices are being added such as a dynamic channel equalizer and the coarse WDM definitions are being aligned with G.cwdm - 20 nm spacing. The next steps in Q.17/15 are to progress draft Recommendation G.671, work on Recommendations G.661, 662, 663 on Amplifiers, review and update Raman amplification and 40 Gb/s requirements, and possibly work on virtual backplane interfaces.

2.2.13 Laser Safety Standards, Rob Johnson (FO-2&6/01-01-008)

Rob gave an update on Laser safety standards. The standards groups involved are:

- *IEC TC76 Optical Radiation Safety and Laser Equipment*

- *ANSI Z136 Safe Use of Lasers*
- *ITU-T SG15/Q16 Optical and Other Transport Networks*
- *IEC TC31 WG8 Risk of Ignition by Radiation From Optical Equipment*

The principal standards are IEC60825-1 and ANSI Z136.1, which are the foundation documents for laser product safety to which all application documents refer, IEC60825-2 and ANSI Z136.2, which are application documents with respect to laser safety of optical fiber communication systems, and ITU G.664, which provides guidelines and requirements for optically safe working conditions on the Optical Transport Network, including conventional SDH systems, for equipment in restricted and controlled locations.

Revision to IEC60825 have been made in which new IEC Laser Safety Classes have been made. These classes now include:

- Class 1 Unchanged (Safe under reasonable foreseeable conditions)
- Class 1M (Class 1 + no optical instruments to be used)
- Class 2 Unchanged (Safe under reasonable foreseeable conditions)
- Class 2M (Class 2 + no optical instruments to be used)
- *Class 3A disappears*
- Class 3R AEL not to exceed class 1 or 2 by more than factor of 5
- Class 3B Unchanged. (Some products will qualify for 1M or 2M class)
- Class 4 Unchanged

The accessible emission limits included in IEC are as follows:

Class 1	10 mW
Class 1M	10 mW
Class 3R	50 mW
Class 3B	≤ 500 mW
Class 4	> 500 mW
Values are based around 1500 nm CW and > 10 sec duration – for guidance only. Class 1M could extend to 164 mW.	

The impact of changes to laser safety include:

- Devices which operate in 1500 - 1800 nm region have been given more leeway before being labeled 3B e.g. EDFAs
- IEC60825-1 is out of sync with other standards
  - 60825-2 under revision and will align with new classification
  - ANSI likely to follow IEC classification but when?
  - G.664 to be revised and will align with IEC classification
- Revisions are likely to address Raman amplification

2.3 Liaison letters received

There were no liaison letters received by FO-2 or FO-6.

2.4 Reports on pending projects, Subcommittees

2.4.1 FO-2.1, Single-Mode Systems, Allen Cherin

Gair Brown reported for FO-2.1.2, Single-mode Transmission Design, stating that no additional work had been done by correspondence. It was suggested that he could keep in touch with the ITU Sup.dsn *Optical system design and engineering guidelines* as a possible document that the WG could contribute to. The editor, Felix Kapron, will send him a copy after the February ITU meeting on the topic.

Allen Cherin reported on work within IEC 86C WG1 (see the FO-2.1 meeting report). Allen also provided an update on the coordination of the work of the PMD progress in IEC 86. Felix Kapron reported for Diane Williams on the IEC 86C/WG4 work on optical amplifiers (see the FO-2.1 meeting report). Felix also reported on IEC 86C/WG4 on active components which the information is contained in the FO-2.1 Subcommittee meeting report.

2.4.2 FO-2.2, Digital Multimode Systems, Gair Brown

A quorum was established with 7 of 14 voting members in attendance. Total attendance was 13.

Elections for the Subcommittee Chair and Vice-chair positions were held. Gair Brown was elected Chair of the FO-2.2 Subcommittee. There were no nominees for the position of Vice-chair.

Report of Working Group FO 2.2.1
After polling the attendees, it was decided to forgo presentation of the FO 2.2.1 report, but the report is attached to the FO 2.2 minutes.

High Performance Parallel Interface – 6400 Mbit/sec Optical Specification
G. Brown (Navy) reported that the previous comments on the draft HPPI specification had been re-circulated on the FO-2.2 reflector for review in December. No feedback on the comments were received via the reflector, so the comments were reviewed in the meeting. Due to the age of the comments, several of the comments needed to be updated. M. Hackert (Corning) was assigned an action to update the transmitter encircled flux recommendation. In addition, Hackert was asked to update comments dealing with multimode fiber optical bandwidth. All attendees were given the action to review the comments dealing with cable skew measurement. Feedback is to be provided to G. Brown for incorporation into the comments. G. Brown will post a copy of the HPPI document onto the reflector for reference. Once agreement on the comments is achieved, G. Brown will forward the comments to the document author.

TIA-785 "100 Mb/s Physical Layer Medium Dependent Sublayer and 10 Mb/s and 100 Mb/s Auto-Negotiation on 850 nm Fiber Optics" (SP-4360)
G. Cawley (Optek) provided a summary of the activity of the TIA-785 Task Force. The Task Force was formed at the previous meeting to address questions on the recently published standard. In particular, the task force was to validate the correctness of the Bessel-Thompson filter specified in Annex A and to investigate the appropriateness of reducing the minimum receiver bandwidth specification. Upon review, the Bessel-Thompson filter specified in Annex A is correct. Cawley reported that the Task Force developed a simple eye diagram model for the 100Base-SX interface. The model was used to investigate the interaction of DCD and ISI. Data previously reported by Tyco indicated that DCD in an optical link is reduced in the presence of high ISI. This leads to overestimation of DCD effects on link performance in high ISI links. The eye diagram model predicts that the presence of ISI does affect the amount of DCD present in waveforms input to the link receiver. The output eye of receivers with significantly lower minimum bandwidth (while considering the DCD-ISI interaction) was shown to identical to the output

eye of receivers meeting the minimum bandwidth specification (under an assumption of no DCD-ISI interaction). Furthermore, it was noted that the stressed receive sensitivity test effectively sets minimum receiver bandwidth performance, so that there is no necessity in the specification of the minimum receiver bandwidth in the TIA-785 specification. As a result of the Task Force's work, an addendum to TIA-785 to remove the minimum receiver bandwidth specification was developed and is currently out on letter ballot (ballot closes February 11, 2002).

FO 2.2 Document Status

Document Number	Author	Publication Date	Status
TIA-785	C. Montstream Ortronics	5/24/01	Due for 5-year review in 2006
TIA-626	G. Brown NSWC	?/?/97	Due for 5-year review in 2002. Subcommittee to decide to reaffirm or revise at June 2002 meeting.
TIA-526-14	None	6/24/1998	Due for 5 year review in 2003

TIA-626 Reaffirmation or Revision

TIA-626 and its upcoming 5-year review was discussed. G. Brown indicated that there had been feedback from document users that the document was hard to use. A revision of the document in the next two to three years would appear to be warranted. However, the document is required to be acted upon during 2002. This action could either be a reaffirmation or a request for extension if a document revision is commenced. There was discussion that if a revision is pursued, it might be more appropriate to revise the document as an IEC contribution and submit the revision to IEC as a US contribution. TIA could then adopt the IEC document as a replacement for the existing TIA document. The sub-committee was asked to consider which of these options was the most desirable and to be prepared to decide on an approach at the June meeting.

100/1000 Mbps Short Wavelength Ethernet Standard

J. Struhar (OFS) discussed possible new work for the Subcommittee in the development of a 100/1000 Mbps short wavelength Ethernet standard. Struhar reported on the results of a BICSI survey of network users, installers and vendors that showed wide support for a 100/1000 low cost short wavelength Ethernet interface. Discussion ensued. Concern was expressed that there did not appear to be broad market potential for this type of interface. A Task Force was established to further investigate the possible scope of the effort, the market potential for the interface, and to identify transceiver manufacturers interested in supporting the development effort.

FOTP-95

G. Brown reported that FO 2.1 asked if FO 2.2 would consider working on FOTP-95 to incorporate requirements for the measurement of multimode optical fiber output power measurements. No objections were noted.

2.4.3 FO-2.3, Opto-Electronic Sources & Detectors, Robert Gallenberger

A quorum was not established at the Subcommittee meeting and, therefore, no official business was conducted. Discussion was held on two items of prime interest to the Subcommittee.

FOTP-142 (PN-4102) "Modal Noise Power Penalty for Laser Transmitters"

Editor, Gair Brown made a presentation summarizing his work on this project since the last meeting. Basically, simulations of modal noise power penalty did not agree with results expected from the equations derived in the draft document. He presented four possible approaches for resolving these

discrepancies. A copy of his presentation will be included in the FO-2.3 Meeting Report

Draft FOTP on Measurement of Frequency Response of Digital Receivers.
This procedure is based upon a procedure outlined in the IEEE 802.3 Gigabit Ethernet Standard. Editor of this document is Bob Throm (NSWC DD). He was not present at the meeting. A rough draft of the test procedure was distributed at the last meeting and comments were requested. Gair Brown indicated that no comments, other than those discussed at the last meeting, were received. It was decided to electronically poll the sub-committee members (due to lack of quorum) and, if approved, proceed to PN ballot prior to the June meeting.

2.4.4 FO-2.6, Reliability of Fiber Optic Systems and Active Optical Components, Pin Su

Pin Su, Chorum Technologies, was re-elected as Chair of the Subcommittee. No nominees were submitted for the Vice-chair position. A proposal was offered on Qualification of Integrated optical Modules involving reliability and qualification, and based on industry documents. Discussion on this topic suggested that the Subcommittee review the applicability of IEC OA documents prior to moving forward with any work. The discussion on MEMS Reliability is postponed until the June meeting. Possible future work may involve a project on laser module reliability based on GR-468 and IEC 61751, and Reliability Assessment of Low Cost Connectors. Pin Su was asked by FO-2/6 to develop a recommendation for the Engineering Committee on reliability assessment of low cost components.

2.4.5 FO 2.7, Optically Amplified Devices, Subsystems and Systems, Jim Matthews

Eleven documents were reviewed for the ITU-T Experts Meeting to be held in February 2002. Close collaboration is being done with T1X1.5. Topics of contributions reviewed were:

- Defining 40G transmitter eye mask with reference receiver in G.693
- Implications of various statistical optical fibre cable PMD specifications
- Q.16/15 IaDI Reference Configuration
- Q.16/15 Unified WDM Grid Recommendation
- Interoperability among G.693 applications
- Approach to 6 dB 40 Gbit/s applications in G.693
- Draft Appendix to Rec. G.693 showing examples of typical applications
- Optical Internetworking Forum Implementation Agreements for Parallel Very Short Reach (VSR) Interfaces
- Revised Draft of Recommendation G.671
- Contribution on RZ bit-rates
- CWDM grid in the G.cwdm draft recommendation

The Subcommittee continues back adoption of IEC published test methods including:

- FOTP 221 - IEC 61291-2 - Optical Fibre Amplifiers - Part 2: Digital Applications - Performance Specification Template
- FOTP 222 - IEC 61290-3 - Optical Fibre Amplifiers - Part 3: Test Methods for Noise Figure Parameters
- FOTP 223 - IEC 61290-5-1 - Optical Fibre Amplifiers - Part 5-1: Test Method for Reflectance Parameters - Optical Spectrum Analyzer

2.4.6 FO-6.1 Fiber Optic Test, Measurement & Inspection Instrumentation, Dennis Horwitz

Several project have been completed including SP-3-0032, IEC 61746: Calibration of Optical Time-Domain Reflectometers (OTDRs), to be published as TIA/EIA-455-226; SP-3-0033, IEC 61744: Calibration of Fiber Optic Chromatic Dispersion Test Sets, to be published as TIA/EIA-455-224; and, SP-3-0034, IEC 61745: End Face Image Analysis Procedure for the Calibration of Optical Fibre Geometry Test Sets, to be published as TIA/EIA-455-225. The projects in process include (TSB-XXX), Fiber Optic Power Meters: Measurement and Application Issues; (TSB-XXX), Optical Return Loss Meters: Measurement and Application Issues; (TSB-XXX), PDL Meters: Measurement and Application Issues; TIA/EIA-455, Standard Test Procedure for Fiber Optic Fibers, Cables, Transducers, Sensors, Connecting and Terminating Devices, and Other Fiber Optic Components; and, rescission ballots for the TIA-573XXXX series for Field Portable Tools. New business was raised regarding (TSB-XXX), Connector Endface Inspection Instrumentation: Measurement and Application Issues, where a presentation is planned to be delivered at the June-2002 meeting.

Work and coordination with IEC 86 is continuing in FO-6.1.1 including documents: IEC 61315, Fibre-Optic Power Meter Calibration Ed.2, in which the next stage is CDV; (IEC-XXX), Reference Receiver Calibration Ed.1; (IEC-XXX), Wave Meter Calibration Ed.1, IEC TC86 WG4, in which the draft is in development; and, (IEC-XXX), Return Loss Meter Calibration Ed.1, in which a RL Round Robin will be conducted in parallel with the draft development.

2.4.7 FO-6.3, Fiber Optic Interconnecting Devices & Passive Products, Tom Ball

Several documents advanced for SP ballot including:

- FOCIS 13 (LX5) Connector - SP Default ballot
- FOCIS 15 (MF) Connector – SP Ballot
- FOCIS 16 (LSH)-SP Ballot
- FOTP 4B (Temperature Life) - SP Revision
- FOTP 5B (Humidity) - SP Default ballot
- FOTP 219 (Multi-fiber Ferrule End Face Geometry) - SP Default ballot

Several documents advance for TIA publication including:

- 6300000 Generic for Fiber Optic Switches
- FOTP 218 End face Geometry for Connectors
- FOTP 228 Reflective Group Delay & Chromatic Dispersion of SM Components by Phase Shift

New projects that have been approved for ballot include:

- FOCIS 5A (MTP/MPO) Connector - SP for revision
- TSB Effect of Epoxy Voids on Connector Performance
- TSB Connector Failure Modes
- SP Ballot to back adopt the IEC MTP/MPO Interface Standard

Projects that are being cancelled include:

- SP 4122 Detail specification for the SG Connector
- SP 4162, FOTP 198, Measurement of Polarization Sensitivity of SM Components by Matrix Calculation Method- Will be resubmitted for a TIA Standard.
- SP 4834A, FOCIS 14 (SMC) Connector failed because of poor TIA ballot response

- SP4681A, FOCIS 604, General and Guidance, Cancelled due to the 1 year ANSI rule

Standards approved for rescission include:
- 4750000, Connector Generic Specification

Standards approved for ANSI reaffirmation include:
- FOTP 15A Altitude Immersion
- FOTP 134 Connector Ferrule Hole Inside Diameter
- FOTP 135 Connector Ferrule ID & OD Circular Run Out

Standards approved for TIA reaffirmation include:
- FOCIS 604-1 Intermateability Std for the Biconic Connector
- 5150000 Generic for Optical Fiber & Cable Splice Closures
- 515B000 Sectional Specification for Splice Closures for Pressurized Aerial, Buried & Underground FO Cables
- 6200000 Generic for Passive Optical Branching Devices
- 620A000 Sectional Specification for SM FO Branching Devices for Outside Plant
- 620AA00 Blank Detail specification for SM FO Branching Devices for Outside Plant
- FOTP 1B Cable flexing for FO Interconnecting Devices
- FOTP 13 Visual & Mechanical Inspection for FO Components, Cables and Assemblies
- FOTP 14A Shock Specified Pulse
- FOTP 21A Mating Durability

2.4.8 FO-6.6, Optical Fiber, Greg Smith

The following is the document status for this Subcommittee:

Publication authorization:
- ITM-23 Measurement of the Nonlinear Coefficient
- ITM-22 Raman Gain
- TSB-62-12 Microbend -

New Project / PN - Ballot (Non-ANSI)
- MMA Method - Muller Matrix Method (TIA non-ANSI FOTP on the MMA that would include an annex on the mathematical equivalence)
- Detail Specification for 850 nm Laser Optimized Multimode Optical Fiber

PN - Ballot (Letter) / Authorization to Publish with resolution of any comments
- TSB-62-21 Fiber Pullout
- FOTP-44B Refractive Index. Profile - Refracted Ray (Montgomery)
- FOTP-220 – DMD Measurement of Minimum Modal Bandwidths of Multi-Mode Fiber Using Differential Mode Delay

PN-Ballot / or Reaffirmation Ballot
- TSB-62-5 Characterization of Attenuation Uniformity of Optical Fibers
  PN-Ballot for Withdrawal
- TSB-62-6 Characterization of Mode Field-Diameter and Cut-off Wavelength of Single-Mode Fibers

with OTDRs
Document has been incorporated in FOTP-191, permission requested to withdraw PN.

SP-Ballot / or Reaffirmation Ballot

- FOTP-3A Temperature Cycling Reballot
- FOTP-46A Spectr. Atten. Long.Length GI OF
- FOTP-53A Attenuation by Substitution Measurement for Multimode Graded-Index Optical Fibers or Fiber Assemblies (Long Length) Reaffirmation Ballot (Author – Dave Leight)
- FOTP-72 Temp./Humid Effects on Optical Char.
- FOTP-73 Temp./Humid Effects on Mechanical Char
- FOTP-113 PMD Measurement for Single-mode Fibers
- FOTP-115 Spectral Attenuation of Step-Index MM Fiber
- FOTP-120 Modeling Spectral Attenuation on Opt. Fibers
- FOTP-171 Attenuation by Sub. Measurement – for Short-Length MM Graded-Index and Single-Mode Optical Fiber Cable Assemblies (reballot)
- FOTP-178 Measurements of Strip Force for Mechanically Removing Coatings from Optical Fibers;

Back-adoption Paperwork

- IEC 60793-1-32. Optical fibres - Part 1-32: Measurement methods and test procedures - Coating strippability
- IEC 60793-1-40 Optical fibres - Part 1-40: Measurement methods and test procedures - Attenuation
- IEC 60793-1-43 Optical fibres - Part 1-43: Measurement methods and test procedures - Numerical aperture
- IEC 60793-1-44 Optical fibres - Part 1-44: Measurement methods and test procedures - Cut-off wavelength
- IEC 60793-1-50 Optical fibres - Part 1-50: Measurement methods and test procedures - Damp heat (steady state)
- IEC 60793-1-51 Optical fibres - Part 1-51: Measurement methods and test procedures - Dry heat
- IEC 60793-1-52 Optical fibres - Part 1-52: Measurement methods and test procedures - Change of temperature
- IEC 60793-1-53 Optical fibres - Part 1-53: Measurement methods and test procedures - Water immersion

SP-Ballot /Authorization to publish with resolution of any comments

- FOTP-122 Polarization Mode Dispersion Measurement for Single Mode Optical Fibers by Stokes Parameter Evaluation

SP-Ballot /Withdraw Document

- FOTP-51A Pulse Distortion MMF
- FOTP-164A SMF Mode-Field Diam - Far Field
- FOTP-121 SP Neutron Induced Attenuation Combined w/FOTP-64
- FOTP-182 SP Hydrogen Evolution

Request Action from FO-2.0 /FO-6.0

- TIA-440 Terminology Document; PN - Ballot / Authorization to Publish with resolution of any comments

2.4.9 FO-6.9, Polarization Maintaining Fiber, Connectors And Components, Rex Craig

Several project have been completed including SP-4245, PM Connector Insertion Loss published as ANSI/TIA/EIA-455-200 in Sept-2001, SP-4246, PM Connector Return Loss, published as ANSI/TIA/EIA-455-201 in Sept-2001, and SP-3-0036, Keying Accuracy of PM Connectors (IEC 61300-3-24), published as ANSI/TIA/EIA-455-227. The projects in process include PN-3-0019, Generic Guidelines for Connectorized PMF/PZF Cable Assemblies, and PN-3783, In-line Polarization Crosstalk Measurement Method (FOTP-199).

FO-6.9 has evolved over the years from "FO Sensors" to "PM Fiber, Connectors and Components" as sensor participation has dwindled. It is expected that the PMF Connector focus will be completed by June-2002 with the publication of a Connectorized PMF TSB. No other component standards efforts have come forth. Therefore, FO6.9 intends to dissolve itself by the end of the June-2002 meetings.

3 NEW BUSINESS

3.1 Other

There was no other new business for the Engineering Committees.

3.2 Action items derived from this meeting

Item #	Action:	Resp:	Status:
2002-01-001	Investigate FO-2.7 Web page access problem	TIA	
2002-01-002	Review and update SC and WG scopes	SC Chairs	
2002-01-003	Benchmark other SDOs like OIF and IEEE	TIA	
2002-01-004	Develop proposal to establish formal liaisons with IEEE and other application groups	Allen Cherin	
2002-01-005	Develop a recommendation for FO-2/6 on reliability	Pin Su	
2002-01-006	Modify June schedule to increase FO-6.6 time from 2 to 4 hours on Wednesday	FO-6 Chair	
2002-01-007	Move FO-2.2 to 8-12 on Tuesday	FO-6 Chair	
2002-01-008	Move 2.3 to 4-6 on Tuesday	FO-6 Chair	
2002-01-009	Prepare a TIA ballot for TIA-440	David Leight	

4 NEXT MEETING, INTERIM MEETINGS, FUTURE MEETINGS

4.1 Next meeting

June 24-27, 2002

Kiawah Island Resort
12 Kiawah Beach Drive
Kiawah Island, SC 29455843/768-2121
843/768-6054-Fax

http://www.kiawah-island.com
Rate: $170.00

4.2 Future meetings

4.2.1 2003 Meetings

January 2003; Florida
June 2003, Portland, OR

5 ADJOURNMENT

The opening plenary meeting adjourned at 10:15 AM on January 21, 2002. The closing plenary meeting adjourned at 5:30 PM on January 23, 2002.

This meeting was conducted in accordance with the TIA Legal Guide and the TIA Engineering Manual.

Steve Swanson, FO-6 Chair

Felix Kapron, FO-2 Chair

Approved by General Counsel

FO-2 & FO6 Meeting Report
Date: 01/21-23/02
Location: Kauai, HI

Approved: 6/6/02
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