



BUILDING GLOBAL COMMUNICATIONS

## Approved by General Counsel

FO-4 Meeting Report

Date: 01/28/04

Location: Arlington, VA

Approved: 06/29/04

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# Telecommunications Industries Association Standards and Technology Department

## Engineering Committee FO-4, Committee on Fiber Optics

### Meeting Report

FO-4 Chair: Steve Swanson  
Secretary and EDC: Bob Jensen

January 28, 2004  
TIA Headquarters  
Vancouver, BC

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## 1 ADMINISTRATIVE

### 1.2 Call, to order

FO-4 Chair, Steve Swanson, called the opening plenary meeting to order on January 26, 2004 at 9:00 AM. This opening plenary session is intended for high-level liaison reports, to update members of committee meeting expectations, and to inform them of administrative essentials.

FO-4 Chair, Steve Swanson, called the closing plenary meeting to order at 2:00 PM January 28, 2004. This closing plenary session is intended to summarize Subcommittee meeting activities and resolve issues arising throughout the week of meetings.

### 1.3 Attendance (quorum, introductions and roster)

Attendance at the closing plenary constitutes the FO-4 membership and quorum. A total of 17 attendees were present at the closing plenary. A quorum for the Engineering Committee was established. The attendees introduced themselves and an attendance roster was distributed for participants to sign.

				Plenary	
				Opening	Closing
<b>Chair:</b>					
Steven Swanson	Corning, Inc.	swansonse@corning.com	607-974-4252	✓	✓

#### Voting members companies present:

Dave Roland	Alcatel USA	dave.roland@cable.alcatel.com	828-459-8775	✓	✓
Ray Lovie	Alcatel USA	ray.lovie@alcatel.com	828-459-8389	✓	✓
Tom Hanson	Corning Inc.	hansonta@corning.com	607-974-4530	✓	✓
Andre Girard	EXFO	andre.girard@exfo.com	418-683-0211		✓
Bob Jensen	Fluke Networks	robert.jensen@flukenetworks.com	512-514-7760	✓	✓
Jack Rosko	Berk-Tek, NEXANS	jack.rosko@berktek.com	919-552-4451		✓
Allen Cherin	OFS	cherin@lucent.com	770-798-2619	✓	✓
Osman Gebizlioglu	Telcordia Technologies	ogebizli@telcordia.com	972-699-3378	✓	✓
Dennis Horwitz	Tempo Research Corp.	dhorwitz@tempo.textron.com	805-384-1835	✓	✓
Matt Brown	US Conec	mattbrown@vsconec.com	828-267-6327		✓
Gair Brown	US Navy	browngd@nswc.navy.mil	540-653-1579		✓

#### Voting members companies absent:

Jack Dupre	Agilent Technologies	jack_dupre@Agilent.com	707-636-9001		
Arthur Hudson	Defense Electronics Supply	Arthur.hudson@dsccl.dla.mil	614-692-0657		
Kenneth Bow	DOW Chemical	kebow@dow.com	989-638-3759		
Barry Cambeilh	Delphi Comm.	barry.cambeilh@delphiauto.com	949-660-5764		

Rex Craig	NIST	rcraig@boulder.nist.gov	303-497-3359		
Ken Marchman	Stratos Lightwave	kmarchman@stratoslightwave.com	708-867-9600		

**Other participants**

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James Matthews III	Corning, Inc.	matthewsje@corning.com	607-974-7608	✓	✓
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Robert Reed	Panduit Corp.		708-532-1800	✓	✓
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Note: Member companies absent from three consecutive meetings will be removed from the voting member list and placed on the non-voting member list. The attendance roster is the sole basis for deriving meeting attendance, so it is important that you sign-in at the meeting. 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 quorum at meetings.

#### 1.4 Agenda review and approval

Steve Swanson reviewed the Opening Plenary agenda topics which was approved by the attendees

The Closing Plenary agenda was reviewed and approved.

#### 1.5 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 third edition of the TIA Engineering Manual.

#### 1.6 Chair's report; general items; elections

At the Opening Plenary, Steve Swanson reviewed the number of people and companies attending for the past year and a half. He described the purpose of the opening plenary and that no quorum is needed to be established unless an election is held. Quorum is always established at the closing Plenary. He then showed the existing quorum list on screen. Steve noted that elections will be held this week in each Subcommittee.

A motion was made to elect Steve Swanson by acclamation. The motion was approved unanimously. Steve reviewed the structure and leadership of the committee, having five Subcommittees. He reminded the FO-4 leadership to cover the IPR statement at their meetings.

Steve recognized Allen Cherin, Art Hudson and Rex Craig with plaques thanking them for their years of support to the FO Committees.

#### 1.7 TIA's report

Susan Hoyler reported on several items:

- Overall staff reduction in June, standards staff medical leave; increased workload
- TIA Board Directive to "recast" TIA standards program; several special teleconferences and meetings with leadership of all engineering committees to discuss marketing plans and tactics

- Two Technical Committee Meetings since June
  - --IPR WG proposed text balloted, remanded for comment resolution (one negative)
    - Goal is to have text resolved at Feb. 13th meeting
    - TIA feeds into ANSI which also feeds into ITU and IEC
  - --Issue of “amendment” or “Addenda”, also called “supplement”
  - --Establishment of Electronic Media Ad Hoc across all Engineering Committees to improve working methods (FTP site, email reflectors, web balloting, database, etc.)
- IEC Sector Board 4
  - Of note is that Michel de Vecchis (the Chair) had completed his 2nd 2-year term, and the call for candidates for a new chair was circulated in November.
  - H. Leppert, Germany, was the only candidate and was approved by acclamation in early January 2004.
  - Discussed the need for clarification of the PAS process, better information exchange between the ITU SG15 and IEC TC86, use of common terminology such as the term “broadband”, identifying new potential area of works for the TCs, and the need for information exchange between the “wired” and “wireless” industry in the telecommunication industry.
  - New ad hoc group entitled the Wireless Internetworking Group (WING) was formed to encourage the exchange of information between the “wired” and “wireless” sectors of the telecom industry.

### 1.8 Distribution and numbering of documents

Document #	Contributor	Company	Title
FO-4/04-01-001	Steve Swanson	Corning, Inc.	ISO/IEC JTC1 SC25/WG3 Liaison
FO-4/04-01-002	Tom Ball		SC86B Liaison Report
FO-4/04-01-003	Tom Ball		TC86 Liaison Report
FO-4/04-01-004	Tom Hanson	Corning, Inc.	ITU SG6 Liaison Report
FO-4/04-01-005	Tom Hanson	Corning, Inc.	ITU SG15 Liaison Report
FO-4/04-01-006	Tom Hanson	Corning, Inc.	SC86A Liaison Report
FO-4/04-01-007	David Leight	Defense Electronics Supply	DoD Liaison Report
FO-4/04-01-008	Tim Drapela	NIST	Report on round-robins
FO-4/04-01-009	Jim Matthews	Corning	IEC86C Liaison Report
FO-4/04-01-010	Paul Kolesar	Avaya	IEEE 802.3 Liaison Report
FO-4/04-01-011	Steve Swanson	Corning, Inc.	IEEE 1222 and 1238 Liaison Report
FO-4/04-01-012	Steve Swanson	Corning, Inc.	Opening Plenary
FO-4/04-01-013	Susan Hoyler	TIA	Opening Plenary Report
FO-4/04-01-014	Bill Gardner		ITU Q15 Liaison Report
FO-4/04-01-015	Steve Swanson	Corning, Inc.	AVFOP Call for abstracts
FO-4/04-01-016	Mike Kinard	OFS	ICEA Liaison Report
FO-4/04-01-017	Jim Matthews	Corning	FO-4.1 Closing Report
FO-4/04-01-018	Dennis Horwitz	Tempo	FO-4.5 Highlights
FO-4/04-01-019	Andre Girard	EXFO	FO-4.3 Highlights
FO-4/04-01-020	Susan Hoyler	TIA	Adopting International Standards
FO-4/04-01-021	Daniel Martinec	ARINC	ARINC Fiber Optic Standardization
FO-4/04-01-022	Dennis Horwitz	Tempo	Fiber optics takes to land and sea

FO-4/04-01-023	Susan Hoyler	TIA	FO-4 Leadership
FO-4/04-01-024	Pin Su	Choum	FO-4.4 Closing
FO-4/04-01-025	Pin Su	Choum	FO-4.4 Scope
FO-4/04-01-026	Jim Matthews	Corning	FO-4.2 Summary
FO-4/04-01-027	Tim Drapela	NIST	NIST Short Course
FO-4/04-01-028	Pin Su	Choum	Recommendations on Reliability

### **1.9 Meeting report review and approval**

The June 2003 meeting report was reviewed at the closing plenary and unanimously approved.

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## 2 OLD BUSINESS

### 2.1 Action item review

Action items were reviewed, which included:

Action item review	Action:	Resp:	Status:
2002-06-009	Place document database on the WEB for all projects so that it can be updated and maintained.	TIA	On-going. Proposal coming at June meeting
2003-06-012	Develop national adaptation procedure.	S Hoyler	On-going

### 2.2 Opening Plenary Reports

#### 2.2.1 DoD, Steve Swanson reported for Dave Leight

Steve reported for David Leight on Mil-Spec status:

- MIL-PRF-28876 and all specification sheets in final draft stage. Minor unresolved issues with termini cavity dimensions.
- MIL-T-29504/4C and /5C. Comment dispositions being prepared. Adding numerous TICC numbers for various fiber sizes.
- MIL-C-83526C and /16 Initial Drafts being prepared for distribution, adding a new specification sheet covering hermaphroditic In-Line connectors for the next generation tactical fiber optic cable assemblies (TFOCA).
- MIL-C-82522/16B Amendment 1 in process to eliminate specific part number configurations B and C for non-locking boot, short and long cap configurations. Configuration D, for either short or long cap is still a valid part number. Comment period has expired.

#### 2.2.2 ICEA, Mike Kinard

ICEA continues to meet quarterly. Since the June liaison report, ICEA has met in September (Gulfport, MS) and December (Orlando, FL)

- ICEA now has four optical fiber cable standards (all the “short” version of the number):
  - ICEA S-640, OSP Cable (Revision, 1999)
  - ICEA S-596, Indoor Cable (Revision, 2001)
  - ICEA S-696, Indoor/Outdoor Cable (New, 2001)
  - ICEA S-717, Drop Cable (New, 2003)

The latter three have been published by ICEA, but are not ANSI approved. The plan is to utilize the Memorandum of Understanding (or whatever the correct legal term is) to put them through the TIA adoption process, which will achieve ANSI approval. The documents will be joint-numbered with the ICEA numbers and the TIA-472-series numbers. They will be:

- S-596 gets TIA-472C000-B,
  - S-696 gets TIA-472E000, and
  - S-717 gets TIA-472F000.
-



All three have been entered into the TIA adoption ballot process (and the ANSI process) within the last month.

S-640 is being withheld from the process because the existing publication is ANSI approved and because there are two active work items involving it:

- Project 716 adds requirements for low temperature performance of cables. The agreed temperature is  $-50^{\circ}\text{C}$ . The document is in Communications Division (that is, final) ballot, which will close at the end of February.
- A general revision of S-640, per the ANSI 5-year review cycle, will begin in March. It is noted that S-640 is the National Standard intended as the effective successor to GR-20.

Currently active projects are:

- 718 – sewer cable. This work is to write a cable standard for cables to be placed in sewers as part of the systems project being worked by ASTM subcommittee F36. A reasonably mature draft has been circulated, but key issues must be resolved by F36.
- 713-mechanical gopher testing. This project is to achieve a mechanical simulation of gopher attack. The live-animal baseline testing has been completed.

Project 719, on 1625 nm performance, is on the back burner due to overall priorities.

The jacket weatherability project begun by TWCS-TAC seems to be continuing in a long-term test mode. No details have been reported recently.

ICEA also has a host of copper telecommunications cable standards and a host of power cable standards that may be of interest. If any further information is required, please contact Mike Kinard.

### **2.2.3 IEC 86, Tom Ball**

New:

- WG 8 (Dynamic Modules), moved to SC86C as WG 5
- TC86 anticipates an invitation to meet September or November in Poland for the 2004 Plenary and WG meetings.
- Japan chairs a new coordination group on categorization to determine which products are in active, passive, dynamic domains.
- The 2005 TC86 Plenary is scheduled for sometime during the week of 17 to 21 October in Cape Town South Africa.
- The current Chair of SC86C is extended by 3 years to July 2007.
- The extension for the current Chair of SC86A is circulating for vote.

Document Activity last June to December 03: (5)

WG4:

- 201/CD, Calibration of Power Meters
  - 202/NP, Calibration of Optical Spectrum Analyzers
  - 208/NP, Calibration of the Frequency Response of Time domain Optical Waveform Measurement Equipment
  - 211/CD, Calibration of FO Chromatic Dispersion Test sets
  - 215/CDV, Calibration of Optical Spectrum Analyzers
-

#### 2.2.4 IEC 86A, Tom Hanson

Within WG1, Fiber, items being discussed include:

- Revise the DMD test to include EMBc
  - Then revise the multimode spec to clean it up
- Revise the nonlinear coefficient to provide length guidance
- Revise the A4 plastic fiber specification 60793-2-40
  - Four or five additional Family specs, more detail
- Technical report on testing needs for EDFA fiber
- Revise the PMD test following resolution on
  - New interferometric analysis (GINTY)
- Polarization cross-talk test
- Add the temperature/humidity cycling test

Within WG3, Cables, items being discussed include:

- Blown products: New Section agreed
  - Different technologies in different Family specs
- New TR on fire performance 62222
- Requests for new work
  - Industrial cable
  - Cable for installation in sewers
  - New performance level for single-mode premises cabling OS2
- Cable for use in patchcords
- Detail spec for outdoor cable
- Details specs to support premises cabling

Within the 86A Plenary, items discussed included:

- Agreed to send liaison/make contributions to ITU SG6
- Agreed on the revision of:
  - Plastic fiber spec 60793-2-40
  - Plastic optical fiber cable 60794-2-40
  - DMD test (and move validity date on 60793-2-10)
  - PMD test
- Agreed to begin work on the requests to WG3
- Agreed to new Sectional for blown products
- Approved publication of the PAS for patchcord cable and premises cabling product specs.

#### 2.2.5 IEC 86B, Tom Ball

New:

- US Convenor of WG5 Confirmed: David Maack, JDS Uniphase.
- US Technical Experts WG6: Matt Brown. US Conec, WG 7: Dr. Li Xu, JDS Uniphase
- US TAG prepares a draft IEC Performance Standard reflecting Telcordia GR326 & 1209 requirements.
- 86B agrees to condense plenary meeting to ½ day

Document Activity:

IEC SC86B circulated (17) standards under development for vote/comment from June through December, 2003

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#### **WG 4 Test Procedures (2)**

- 1897/NP, Attenuation of SM Alignment Sleeves/Adaptors
- 1900/Question: Reinstatement of Closure test procedures

#### **WG 5 Reliability-(2)**

- 1889/NP, Reliability Part 2-1: Design of an acceptance test for fibre pistoning failure during temperature & humidity cycling
- 1896/FDIS, Reliability Part 7, Life Stress Modeling

#### **WG6 Interconnecting Devices and Hardware (8)**

- 1874/CD, Performance Standard, General & guidance
- 1875/CD, Optical Interface, SM angled PC Fibres, level 2
- 1876/CD, Optical Interface, General & Guidance
- 1879/CD, Optical Interface, SM, Flat endface, Rectangular Ferrule
- 1880/CD, Optical Interface, SM, Angled PC, Rectangular ferrule
- 1882/CDV, Interface Std for the MPO Connector
- 1884/NP, Performance Std for Fibre Mgt Systems
- 1891/CDV, Interface Std for SMI Connector for Plastic fibre

#### **WG7 Passive Components (5)**

- 1883/CD, Performance Standard, Non-Connectorised Wavelength for SM Switches
- 1885/PAS, Performance Standard, SM Middle-Scale DWDM Devices for Cat C
- 1886/CD, Performance Standard for Non Connectorised Medium Scale SM MxN Component, Spatial Switches for Cat O
- 1887/CD, Performance Standard for Non connectorised SM 1/N,2xN non-wavelength Selective Branching Devices for Cat O
- 1890/FDIS, Performance Standard for Continuously Variable Attenuators for Category U

Next meeting of WG 4, 6 & 7 is 18 to 23 April 04 in Lacarno, Italy. WG 5 is not scheduled to meet.

#### **2.2.6 IEC 86C, Jim Matthews (FO-4/03-06-044)**

Jim Matthews provided an overview of the activities in IEC SC86C.

General items:

- Pietro DiVita nominated (and reconfirmed) for another term as Chair
- Message from the chair about “Parochial” standards (directed beyond 86C?)
- 30 documents were published; 21 were approved for FDIS; 9 CDVs were approved; 3 CDVs were circulated; 3 NPs were accepted; and 4 MCRs were circulated.

Working Group 1, Fibre Optic Communication Systems and Subsystems

- 2 Meetings Since Beijing (Vancouver/June, Montreal/Sept.)
  - Progress on PMD Umbrella Document (Girard)
  - Disagreement on Interferometric PMD – Hanson to referee
  - Differences with SC86B on MM Fiber Mandrel Launch Size
  - Current / New Work:
    - IEC 61280-2-2 Optical eye pattern, waveform, and extinction ratio measurement.
    - IEC 61280-2-3 Measurement of jitter parameters.
    - IEC 61280-2-10 Measurement of time resolved chirp and alpha-factor measurement of
-

- laser transmitters.
- IEC 61280-2-11 Measurement of average Q-factor.
- IEC 61280-2-X Data Analysis of BER versus received power.
- IEC 61280-4-4 PMD measurement for installed links.
- IEC 61282-8 Calculating dispersion penalty from time resolved chirp measurements.
- IEC 61282-9 Guidance on PMD measurements and theory.
- Development of conformance measurements or design guide for a black link.
- PMD open issues including power penalty relationships.

#### Working Group 3. Optical Amplifiers

- 2 Meetings since Beijing (Atlanta, Montreal )
- 17 Members, 8 Corresp. Members, 8 Countries
- Revision / Update of Terminology (61291-1)
- 61292-4(TR) Maximum permissible optical power for the safe and damage-free use of OAs with the high power limit for the following issues:
  - Fibre fuse and its propagation
  - Temperature increase in the splice point/connection point
  - Fibre end-face damages due to the dust/contamination
  - Fibre coat burning and ignition of hazardous environments due to fibre tight bending/break.
- Draft 61292-5(TR: the umbrella document of PMD test methods for OAs) will include a "navigation matrix" of PMD test methods for OAs as well as the PMD issues related to the trade and commerce of OAs.
- Future plan of work of 86CWG3 includes:
  - Metro use, cost reduction, flexible operation/integration/hybridization/customization of OAs.
  - Test methods on the parameters related to Raman and other amplifiers.
  - Promotion of OA standards and guidelines developed by 86CWG3.

#### Working Group 4, Fibre Optic Active Components and Devices

- Two Meetings since Beijing (Atlanta, Montreal)
- 86C/433NP, package interface standard for miniature pump laser diodes -looking for a new PL
- IEC62007-1 and 62007-2 (Semiconductor optoelectronic devices for fibre optic system applications: Essential ratings and characteristics (-1) and measure ring methods (-2) Reconfirmed
- Decided to prepare NPs for the revision of measuring methods aiming to adjust IEC62007-2 to the current document structure of SC86C. When the NP becomes IS, IEC62007-2 should be withdrawn.
- Component Type Definitions
  - What is Active and Passive?
  - Interaction With SC86B / WG7
  - Proposed Coordination Group to Classify Types of Components
  - Yasuhiro Ando (Japan) Named group leader

#### Other news 86C

- Strong interaction and cooperation with ITU-T SG15 continues
  - TC86 plenary decision
    - Move TC86 / WG8 Dynamic Modules (Pin Su DiCon, USA) to SC86C
-

- NEW SC86C / WG5 Dyanmic Modules
- Transition in SC86C WG1
  - Allen Cherin will retire
    - We will miss his leadership and contributions

### 2.2.7 IEEE 802.3, Paul Kolesar

Recently completed work in IEEE 802.3 includes:

- DTE Power via MDI (802.3af)
  - Powers 10/100/1000-Mb Ethernet device over 100m Cat 5e cabling
- 10GBASE-CX4 (802.3ak)
  - 15m on InfiniBand 4X type shielded cable

Work in progress includes:

- Ethernet in the First Mile (802.3ah) – final ballot stage
  - Support subscriber access network topologies:
    - Point to multipoint on optical fiber
    - Point to point on optical fiber
    - Point to point on copper
  - Provide a family of physical layer specifications:
    - 1000BASE-LX extended temperature range optics
    - 1000BASE-X  $\geq$  10km over single SM fiber
    - 100BASE-X  $\geq$  10km over SM fiber
    - PHY for PON,  $\geq$  10km, 1000 Mbps, single SM fiber,  $\geq$  1:16
    - PHY for PON,  $\geq$  20km, 1000 Mbps, single SM fiber,  $\geq$  1:16
    - PHY for single pair non-loaded voice grade copper distance  $\geq$  750m and speed  $\geq$  10Mbps full-duplex
    - PHY for single pair non-loaded voice grade copper distance  $\geq$  2700m and speed  $\geq$  2Mbps full-duplex

Work that has just begun includes:

- 10G Ethernet on FDDI-grade MMF
  - Dispersion compensation technologies
  - 220 – 300m distances
- Backplane Ethernet
  - System on a blade
  - Multi-vendor rack interconnection

Possible future work includes:

- "Data Center Ethernet" (name may change)
  - March, 2004 Plenary meeting
    1. Provide lower latency transport
    2. Provide ensured delivery
    3. Enable RDMA over Ethernet

### 2.2.8 IEEE 1222 and 1138, Steve Swanson

Steve reported on work in IEEE 1222 and 1138 that included:

- All dielectric self supporting cables
  - IEEE 1222 has been recently approved

- WG is working defining and improving definitions and test methods
  - Dry band Arcing,...
- Optical Power Ground Wire
  - Defined in IEEE 1138
  - WG is doing the same as 1222 but is more advanced
    - definitions, scope, ... are ~80% complete

### 2.2.9 ISO/IEC JTC1 SC25/WG3, Steve Swanson

Highlights from this meeting included:

- One meeting since TIA FO meetings in Vancouver
  - SC25 and WG meetings held in Zurich, CH Sept 15-19, 2003
- The FDIS (25N780) for 11801 2nd edition was approved for publication
- Key work items
  - Development of an industrial cabling standard
  - Development of a home cabling standard
  - Revision of ISO/IEC 14763-3 on fiber optic testing
  - Development of a standard on wireless access points and power provisioning
  - Recommendations on cabling to support 10GBASE-T (copper)

The 2<sup>nd</sup> edition of ISO/IEC 11801 has:

- Four fiber types are specified to support various classes of applications
  - Three multimode fibers (OM1, OM2, and OM3) complying with IEC 60793-2-10 (A1a.1, A1a.2 and A1b)
  - One single-mode fiber (OS1) complying with IEC 60793-2-50 (B1)

Correspondence on fibre items included ISO/IEC JTC1 SC25 N906:

- Outlines requirements for compatibility between cables and connectors
  - experts of SC 25/WG 3 have reviewed the document 86A/856/NP and concur with the opinion as stated in IEC SC86A liaison report (WG3 Zurich 038)
- SC25 requests IEC SC86A and SC86B prioritize the work in order to get the required specifications on the market at the earliest possible date.

**Note:** A joint TG (86A/WG3 and 86B/WG6) has been formed

Correspondence on fibre items included ISO/IEC JTC1 SC25 N913:

- Outlines requirements for a new single-mode optical fibre (OS2) in support of draft ISO/IEC 24702
- ISO/IEC JTC 1/SC 25 requests IEC SC 86A to provide information regarding possible attenuation specification of this cabled optical fibre when operating at 1625 nm.
- This specification is to support high bit rate applications over distances in excess of those defined in ISO/IEC 11801 to include 5 000 m and 10 000 m.
  - For this reason, it is probable that OS2 will be implemented in cable constructions for outdoor use. However, input is requested from IEC SC 86A regarding the feasibility of the above specification within cables intended for installation within buildings as both distribution and patch/equipment cables.

Points of interest included:

- Industrial cabling
  - 2 new single-mode channels proposed, OF-5000 and OF-10000, supporting 5 and 10km

- channels
- New single-mode fiber category, OS-2, specified with 0.4 dB/km attenuation
- Channels for POF and HCS under discussion
  - Shorter than currently specified
  - Test methods needed
- Modifications to fiber optic testing guide (ISO/IEC 14763-3)
  - Simultaneous measurement of two fibers in opposite directions
  - Will require testing at 850 and 1300nm
  - Will require modified launch conditions
    - 18mm vs. 25mm mandrels

### 2.2.10 NIST, Tim Drapela

Tim reported on activities on round-robin testing and measurement verification. He noted that FO-4.5.1 will be meeting on Monday afternoon at 2PM. Current activities include:

- Raman Gain Efficiency RR (for FO-4.2.1[former 4.6.1]) – preliminary report
- Return Loss RR (for FO-4.5[former 4.9] and IEC) – under development
- w/FO-4.2.1 – Long-term effects of 1999 Aeff/MFD RR
- Monitoring ITU/IEC RRs

### 2.2.11 ITU Q.15/15, Bill Gartner, Tom Hanson

A meeting of ITU-T WP 4/15 Q.15/15 was held October. 27-28, 2003 which included:

- o Extensive revision of the chromatic dispersion curve fitting procedures
- o Exfo proposed a revision of the interferometer ATM for PMD that eliminates limitations of the present ATM. Italy proposed another approach. Reconciliation efforts underway in ITU and IEC.
- o New question 20/15 for "optical fibers for broadband services to and in buildings and homes". Implementation strategies require the study of such issues as:
  - o Novel media (plastic fibers)
  - o Mixed media (hybrid fiber/coax)
  - o Reliability in the local network
  - o New rec. G.656 for a new fiber for the S, C, and L bands is progressing by correspondence group

### 2.2.12 ITU SG6, Tom Hanson

A brief update was given on approved Recommendations including:

- o L.55 Digital database for underwater links
- o L.19 Multi-pair copper network cable supporting shared multiple services
- o L.50 Requirements for passive optical nodes: Optical distribution frames for central office environments
- o L.54 Splice closures for marinized terrestrial cables
- o Optical fibre cables: Special needs for access networks
- o The group is defining the study points for the next study period: The focus in on what, in the outside plant, is needed to advance broadband to the premises.

## 2.3 Reports on pending projects, Subcommittees

### 2.3.1 FO-4.1, Optical Fiber Systems, Jim Matthews for Gair Brown, Allen Cherin

Quorum was established for the meeting and elections held. Elections resulted in Jim Matthews, Chair and Gair Brown, Vice Chair. All recognized Allen Cherin for his years of hard work and wished him well in his future endeavors.

The scope of the Subcommittee incorporates that of the "old" FO-4.1 and FO-4.2. In addition, oversight

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of ITU-T physical media will take place including SG15 / Question 16 on Transport Networks, SG15 / Question 17 on Optical Subsystems and components, while fostering interaction with key end-user constituents. The scope of the Subcommittee includes:

The FO-4.1 Engineering Subcommittee on Optical Systems addresses the design and characterization of single-mode and multimode components, sub-systems, systems and networks across all applications. It is responsible for:

- Fiber-Optic Test Procedures (FOTPs) for the measurement of
  - Optical path attenuation, reflections, chromatic dispersion, polarization mode dispersion, and non-linear effects.
  - Multimode fiber launch condition related parameters.
  - Optical amplifier parameters.
  - Digital Systems: bit-error ratio, optical eye pattern, extinction ratio, jitter, power penalties.
  - Analog Systems: carrier-to-noise ratio, composite second-order distortion, composite triple-beat noise, cross modulation.
  - Network optical performance.
- Design guidelines concerning physical layer photonic aspects of
  - Single-mode and multimode fiber optic systems,
  - Multichannel (multiwavelength/WDM) systems,
  - All-optical networks
  - Nonlinear and other transmission limiting effects
  - Devices and techniques for compensation and modulation of system transmission limiting effects
- Development of test methods to support physical-layer media-dependent design, installation, and conformance to established standards for LANs and other application standards.
- Discussion and coordination of US positions for international bodies such as the IEC and ITU, dealing with the use of components and subsystems, including physical layer photonic aspects of optical networks

One Working Group will continue under FO-4.1, FO-4.1.2, Modal Dependence of Multimode Fiber Bandwidth. Peter Pleunis is unable to continue as chair resulting in Paul Kolesar, Avaya, accepting the appointment. The FO-4.1.2 topics and actions include:

- Skew TSB
  - Agreed to Change from FOTP to TSB
  - Open Issues:
    - Launch Conditions of One Meas. Per Fiber,
    - DMD of Individual Fibers in The Skew Calculation
- Bandwidth Scalability
  - Modeling to date including possible improvement of calculation to include laser lines
  - Agreed on Two Fiber Sets for 10Gb/s 150m
  - Future teleconference on 10Gb/s 600m
- EDC – Liaison Presentation to IEEE
  - What is needed next? Installed Base Characterization?
- Next Teleconference: 02/12/2004 11:00-13:00 (EST)

Other business in FO-4.1 included:

- Document Status:
-



- Formal Action on SKEW TSB
- Others deferred to correspondence, next meeting
- IEC Harmonization – Consider projects 6/04 Meeting
- Update of ITU Activity and Implications of Black Link Concept
  - Allows ownership and deployment of infrastructure – Municipalities, etc.
  - Possible across multiple applications
- Multimode Launch Conditions
  - IEC 61300-1 Has Overfilled and Restricted
  - Different from North America (TIA)
  - Tighter than OFSTP-14: Can it be Realized?
  - Restricted may be consistent with 70/70 but no guidance given on use, not used for components
  - IEC document proscribes mandrels not consistent with Overfilled or Restricted
  - Discuss With US TAG SC86B and FO 4.3
  - TIA IS Consistent with IEC 61280-4

### **2.3.2 FO-4.2, Optical Fibers and Cables, Tom Hanson**

The first meeting of the FO-4.2 Subcommittee on Optical Fibers and Cables was called to order by the joint temporary chairmen: Tom Hanson and Mike Kinard. A quorum of 7 of 12 voting members was established, with 8 other individuals in attendance.

Elections for Chair and Vice Chair were conducted with the following result:

Chair: Thomas Hanson                      Vice Chair: Michael Kinard  
Scott Chastain was named as the EDC for the subcommittee.

The scope and working groups for the restructured FO-4.2 were agreed (see below):

#### **FO-4.2 Optical fibers and cables**

**Prepare standards for optical fibers and cables. Activity includes the preparation and recommendation of Generic, Sectional, Blank Detail, and Detail Specifications; preparation and recommendation of test procedures, and design guidelines, including:**

1. Determine fiber and cable parameters or attributes that require specification.
2. Propose and approve fiber and cable standards (specifications).
3. Propose and approve fiber and cable test methods and procedures.
4. Define fiber and cable terminology.
5. Coordinate fiber and cable committee standardization efforts with other subcommittees, including those for: connectors, metrology, systems, amplifiers, and other subcommittees.

#### **Working groups:**

Maintain two current working groups:

4.2.3 Single-Mode Fiber and Standards Harmonization (1/2 day under Jim Refi)

4.2.4 Color coding (2 hours under Ray Lovie)

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These scopes are unchanged and are included in the reports.

Add a new working group:

4.2.5 Products for (air assisted) installation by blowing (2 hours under Ken Chauvin)

The new WG will prepare a scope.

The meeting authorized specific actions on 8 documents including 3 on the adoption ballots of the ICEA documents. The meeting authorized reaffirmation actions on 13 documents. The meeting agreed that corrective action should be initiated on three additional document.

The meeting reviewed the reports of the three existing working groups and agreed with the actions that were recommended. The meeting agreed to move the content of the advisory group on SC86A/WG3 into the main subcommittee. The group agreed to form a new working group that will focus on the needs of products for installation by blowing.

The meeting had discussions and agreements of direction on the following subjects:

- a. PMD
- b. ICEA MOU
- c. ICEA progress (717, 596, 696)
- d. FOTP-33
- e. FOTP-3
- f. International Adoptions

The meeting considered strategies going forward and agreed that it might be possible to create some consensus documents that would be helpful in advancing the FTTP market or solve some common problems in that regard.

### **2.3.3 FO-4.3, Interconnecting Devices and Passive Components, Tom Ball, Andre Girard Election**

Co-Chairs elected: Tom Ball and Andre Girard

#### **Scope:**

The FO-4.3 Engineering Subcommittee on Interconnecting Devices and Passive Components is responsible for the development and maintenance of standards, and related test methods as required by industry for fiber optic interconnecting devices and passive components. Fiber optic interconnecting devices and passive components include, but are not limited to connectors, cable assemblies, splices, splice closures and similar types of products, and fiber optic switches, attenuators, branching devices, isolators and WDM devices or any device passively manipulating optical power.

Particular emphasis will be placed on harmonizing FO-4.3 documents with standards being developed by the International Electrotechnical Commission (IEC) and providing proposals for new or improved documents to IEC.

FO-4.3 presently has three (3) Working Groups (WG) with titles and scopes as follows:

#### ***FO-4.3.1 Working Group: Passive Components***

This WG prepares and maintains performance standards and associated test methods for passive

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components.

***FO-4.3.2 Working Group: Interconnecting Devices***

This WG prepares and maintains intermateability and performance standards, and associated test methods for interconnecting devices.

***FO-4.3.3 Working Group: Reliability***

This WG prepares and maintains reliability standards and associated test methods for interconnecting devices and passive components.

**Appointments**

WG-4.3.1 Working Group on Passive Components

Chair Appointed: Pin Su

Time Slot: Monday PM

WG-4.3.2 Working Group on Interconnecting Connecting Devices

Chair appointed: Matt Brown

Time Slot: Tuesday AM

WG-4.3.3 Working Group on Reliability

Chairs appointed: Bruce Lefevre and Osman Gebizlioglu

Time Slot: Tuesday PM

**Documents**

Advanced for SP Ballot

8 FOCIS to remove the option d=0:

FOCIS 2 (BFOC)

FOCIS 3 (SC)

FOCIS 4 (FC)

FOCIS 6 (FJ)

FOCIS 10 (LC), and to revise drawings

FOCIS 12 (MT-RJ)

FOCIS 13 (LX.5)

FOCIS 16 (LSH)

FOCIS 5 for revision to include fiber counts up to 72

FOTP-219 (Multifiber Endface Geometry Measurement) for revision to include an alternate test method for measuring ferrule produced in an alternate process

**Advanced for TIA Publication Process**

TSB 149 (PN-3-0106) to proceed for publication

**Advanced for TIA/ANSI Publication Process**

FOCIS 12 (MT-RJ)

FOCIS 17 (MU)

**New Projects Approved for Balloting**

PN ballot for direct adoption of IEC 62005-2 (Reliability of fibre optic interconnecting devices and passive components – Part 2: Quantitative assessment of reliability based on accelerated ageing tests – Temperature and humidity; steady state): as TIA ANSI standard

**Projects Cancelled**

None

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### **ANSI Standards Approved for Expiration to TIA standards**

Feb 2004:

FOTP-107A (Return Loss)

FOTP-172 (Flame Resistance)

FOTP-186 (Gage Retention)

FOTP-187 (Engagement and Separation Forces)

May 2004:

FOTP-193 (Polarization Crosstalk)

Oct 2004:

FOTP-32 (Circuit Discontinuity)

FOTP-35 (Dust test)

FOTP-184 (Coupling Proof Overload Test)

FOTP-185 (Strength of Coupling Mechanism)

Nov 2004:

FOTP-180 (Transfer Coefficient of Branching Devices)

FOTP-196 (PMD in SM Components)

Dec 2004:

FOTP-194 (Fiber Pushback)

### **ANSI Standards Reaffirmed**

None

### **TIA Standards Reaffirmed**

None

### **2.3.4 FO-4.4, Fiber Optic Amplified Systems, Active Components, and Reliability – Pin Su**

Four of six members were in attendance, therefore meeting quorum. Elections resulted in Jim Matthews withdrawing and Pin Su acclaimed as Chair. The Vice-chair position remains open. The scope for the Subcommittee was approved as follows:

The FO-4.4 Engineering Subcommittee addresses reliability and characteristics of active optical components, optical amplifiers, and other modules or sub-systems, and coordinates reliability standards issues related to fiber optics (including passive components and systems). It performs the following functions:

- Developing standard parameters and associated definitions for active components, OAs, and (amplified) subsystems
  - Developing recommendations and practices for use of OAs and amplified subsystems in single-channel and multi-channel systems.
  - Developing appropriate specifications for active components, OAs, and subsystems.
  - Developing appropriate test methods to measure parameters of functional interest for active components, OAs, and subsystems.
  - Discussion and coordination of US positions for international standards bodies such as the IEC and ITU, dealing with active components, OAs, and their uses in systems.
  - Developing reliability requirements for active components, OAs, and subsystems.
-

A reliability coordination Task Group has been established with the mandate to:

- Developing guidelines on the translation of system reliability requirements into discrete system elements.
- Developing reliability guidelines (assessment procedures, parameters, and their associated definitions) and requirements.
- Reviewing and coordinating reliability needs, activities, and requirements.

FO-4.4 Work Documents and Future Plans include:

- Two documents in process from previous FO 4.4.
- Documents from previous FO 4.5:
- Establish the scope of new FO 4.4 and re-establish the membership basis.

### **2.3.5 FO-4.5, Fiber Optic Metrology, Dennis Horwitz and Tim Drapela**

Quorum was reached with 8 of 10 voting members in attendance. Scopes were unchanged from last January (see below):

#### **FO4.5: Subcommittee on Fiber Optic Metrology**

The FO-4.5 Engineering Subcommittee on Fiber Optic Metrology addresses fiber optic test, measurement and inspection instrumentation functionality and related calibration issues in support of other fiber optic standards groups, test procedures and test methods. This includes, but is not limited to:

Determine instrument parameters or attributes that require specification.

Propose and approve standards and specifications.

Propose, review and approve test methods and procedures relevant to calibration, usage and maintenance.

Coordinate with other industry standard bodies, and form joint task groups to resolve test and measurement issues of mutual interest.

#### **FO4.5.1: Working Group on Round Robin Testing and Measurement Verification**

Coordinates, monitors, and analyzes industry round robins (interlaboratory comparisons) for validation of fiber optic test procedures and development of calibration resources. The objective of round robins is to determine measurement reproducibility and repeatability across industry, for purposes of trade and commerce.

The chair of this WG is empowered to develop and/or coordinate a round robin in support of another SC or WG. In general, the sponsoring SC or WG shall be responsible for developing framework and details of the round robin while FO4.5.1 shall supply the additional expertise to ensure a useful and meaningful result.

### **FINISHED PROJECTS**

SP-3-0082	TIA-455-231; FOTP-231, IEC 61315 – Calibration of Fibre Optic Power Meters	Published August-2003. Author: Dennis Horwitz-TEMPO
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SP-3-1384-RV2	TIA-440-B; Fiber Optic Terminology	Ballot completed, comments resolved, and authorized for publication. Author: David Leight, DSSC
Various SP-XXXX-WD	Withdraw TIA-573XXXX series for Field Portable Tools	Remaining 9 documents WITHDRAWN effective August-2003. Author: Dennis Horwitz-TEMPO

**IN-PROCESS PROJECTS**

PN-3-0064	TSB-141; PDL Meters: Measurement and Application Issues	Second ballot was closed, comment disposition uncertain. SC approves for publication pending resolution of votes/comments. Author: Dennis Horwitz/Tim Drapela (for ex-NIST Rex Craig)
PN-3-0065	TSB-142; Optical Return Loss Meters: Measurement and Application Issues	PN ballot closed and comments were resolved. Then document circulated internally for comments. Due to significant changes, SC authorizes 2 <sup>nd</sup> PN ballot pending incorporation of Light Brigade comments (after final circulation for internal comments). Author: D Horwitz-TEMPO (for ex-TEMPO Lorenz Cartellieri)
PN-3-0066	TSB-143; Fiber Optic Power Meters: Measurement and Application Issues	Votes/comments from previous PN ballot need disposition. SC authorizes 2 <sup>nd</sup> PN ballot prior to next meeting. Author: Andre Girard-EXFO
PN tbd	TIA/EIA-455; Standard test procedure for fiber optic fibers, cables, transducers, sensors, connecting and terminating devices, and other fiber optic components	As authorized at Jan-2003 FO4 Closing Plenary, FO4.5 needs to request PN, then submit to SP ballot with the "calibration" text previously developed by FO6.1.10. Add Launch Condition Appendix? Shorten title to "STP for FO Components"? Author: Dennis Horwitz-TEMPO
PN tbd	TSB-XXX, Connector Endface Inspection Instrumentation: Measurement and Application Issues	No action since last meeting. TSB will be circulated one more time for internal comments. Then request PN and submit for PN ballot. Author: Harvey Stone/NOYES FIBER SYSTEMS
Future TSB	TSB-XXX, Guidelines for Round Robins	Draft to be developed as part of planning Return Loss RR. Author: Tim Drapela, NIST
Round Robin under FO4.9.1	Return Loss Round Robin	Refined Return Loss RR plan was reviewed and will be submitted to FO4.3 and FO4.5 reflectors for final comments and identification of additional participants. Will then draft RR detailed instructions, Tempo-Oakville (Opto-Electronics Inc.) will fabricate test specimens, and RR will proceed ASAP.

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	Co-Authors: Tim Drapela-NIST and Dennis Horwitz-TEMPO
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## **NEW BUSINESS**

Does Industry have interest in NIST developing and presenting a Fiber Optic Course? Comments to draft curriculum?

NIST budget MAY preclude Tim Drapela from attending June-2004 meeting. Full impact on FO projects to be clarified by Tim.

## **NEXT MEETINGS**

Next IEC TC86 WG4 meeting has been scheduled for 9/27/2004 at NIST in conjunction with SOFM 2004 (9/28-9/30).

Next FO4.5.1 meeting scheduled for Monday afternoon, 6/21/2004 at TIA HQ in Arlington-VA  
Propose next FO4.5 meeting for Tuesday afternoon, 6/22/2004 at TIA HQ per switch with FO4.4

## **3 NEW BUSINESS**

### **3.1 Multimode launch conditions**

Gair Brown provided a summary of adhoc discussions during the week for the purpose of establishing a TIA position on multimode fiber launch conditions to take into IEC SC86B. FO-4 agreed to set up a correspondence group to develop a position for consideration by the 86B TAG.

### **3.2 NFPA Update**

Ken Chauvin (CCS) presented an update on the activities in the National Fire Protection Agency(R) (NFPA(R)) regarding the fire performance requirements for cable in air-handling spaces (including drop ceiling and raised floor cavities, in addition to true plenum and air ducts). Indications are that forces within the various NFPA technical committees involved in setting cable requirements are pushing a solution that will ultimately exclude "plenum-listed" optical fiber cable from building horizontal spaces. The primary concern expressed by proponents of the change is over the build-up of generations of copper cables, which have resulted in a significant amount of fuel loading in some places. Listings to the more stringent requirements sought have only be achieved by copper cables with FEP insulation jacket. It is highly likely that fiber optic cable designs will never be able to meet the proposed performance requirements, and still also be able to meet the conventional mechanical and environmental pe

### **3.3 Schedule review**

Andre Girard (EXFO) proposed eliminating the opening plenary meeting so that the WG schedule could be moved forward a 1/2 day to allow FO-4.2 and FO-4.3 in consecutive time slots rather than concurrently. There was significant discussion regarding the pros and cons of conducting an opening plenary meeting. A compromise was put forward to start the opening plenary at 8am for 1 hour and start the WGs at 9. The Chair was asked to put together a schedule for review by the SC for the 6/04 meeting.

### **3.4 Future meetings**

Andre Girard presented a proposal to consider a new process for selecting future meeting sites to include asking member companies to consider "hosting" the meeting at company facilities or co-locating with "customers." We explored the possibility of meeting in Chicago in conjunction with Supercomm but ruled

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that out due to costs. We also discussed possibly meeting with other TIA groups (e.g., TR-42) to leverage TIA's "negotiating" powers. Another option discussed was to allow the TIA meeting planner to propose multiple options which the Committee could choose from. FO-4 agreed to keep the June 21-24, 2004 meeting in Arlington. The Chair will schedule a teleconference with the Committee leadership to discuss a process going forward.

Discussions were held on future meeting venues. Bob Jensen provided a contribution on where FO-4 members reside. This information was helpful in determining appropriate locations to help in gaining more attendance at meetings. It was decided that the next two meetings of FO-4 would be held at the TIA headquarters in Arlington, VA.

#### **4 ADJOURNMENT**

The opening plenary meeting adjourned at 12PM on January 26, 2004. The closing plenary meeting adjourned at 6PM on January 28, 2004.

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

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Steve Swanson, FO-4 Chair

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Bob Jensen, FO-4 Secretary

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