Standardization Activities in IEC TC86 (Fiber Optics)

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Abstract

The International Electrotechnical Commission Technical Committee 86 (IEC TC86) is responsible for international standardization in the field of fiber-optic communications. This article introduces TC86 standardization activities and recent topics arising from the meeting held during September 9–18, 2004 in Warsaw.

1. IEC

The International Electrotechnical Commission (IEC) is the leading global organization with regard to the preparation and publication of international standards for all electrical, electronic, and related technologies [1], [2]. Its objectives are to deal with all standardization problems and related issues such as conformity assessment for these technologies. Specifically, IEC develops international standards and assesses worldwide conformity to them in terms of performance, safety, durability, and other criteria.

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2. IEC structure

The organizational structure of the IEC is shown in **Fig. 1**. The IEC is headed by the Council, which is responsible for managing the IEC's work on standards and setting the timelines for producing standards. The Standardization Management Board (SMB) and the Conformity Assessment Board undertake specific management responsibilities in relation to standards and conformity assessment. Industry Sector Boards are responsible for advising on priori-

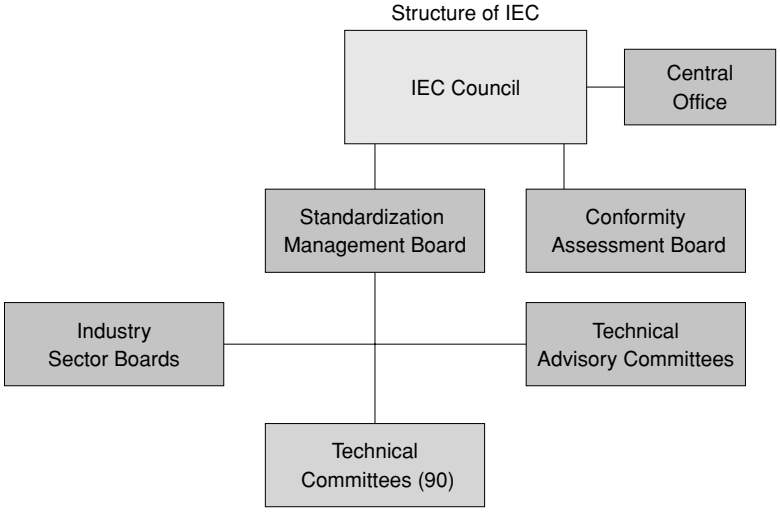

Fig. 1. Structure and role of IEC.

ties and ensuring the continuing market relevance of IEC standards. All Technical Committees (TCs) come under the SMB and new ones are created and old ones disbanded in response to the changing trends of technology in the electrical and electronic fields. Currently, there are 90 active TCs.

3. Structure and scope of TC86

The objectives of TC86, entitled "Fiber Optics", are to prepare standards for fiber optic systems, modules, devices, and components intended primarily for use with communications equipment. The standards specified by TC86 cover terminology, characteristics, related tests, calibration and measurement methods, functional interfaces, and optical, environmental, and mechanical requirements with a view to ensuring reliable system performance by using appropriate quality assessment procedures. The structure and technical fields of TC86, which are subdivided into Sub Committees (SCs) and Working Groups (WGs) are shown in **Fig. 2**. The International Standards specified in TC86 are shown in the **Table 1**. The latest topics and tasks related to each WG are described below.

4. Latest topics discussed in Warsaw meeting

SC86A/WG1

There was discussion about a new type of optical fiber to be used for interconnections within or between components or photonic systems and SCL-band transmission NZ-DSF (non-zero dispersion-shifted fiber optimized for transmission in the S, C, and L bands) corresponding to ITU-T/G.656. With regard to measurement methods, the polarization mode dispersion (PMD), macrobending loss, and fiber curl measurement methods were discussed in relation to maintenance and revision. Moreover, discussions were held in relation to new technical reports on the polarization crosstalk and residual stress test methods and the effect of stimulated Brillouin scattering on analog transmission.

SC86A/WG3

The main discussions related to optical fiber cable focused on installation by blowing optical fiber cable through microducts, cables for use in patchcords, and detailed specifications for underground cables. The POF (plastic optical fiber) Task Force led by the

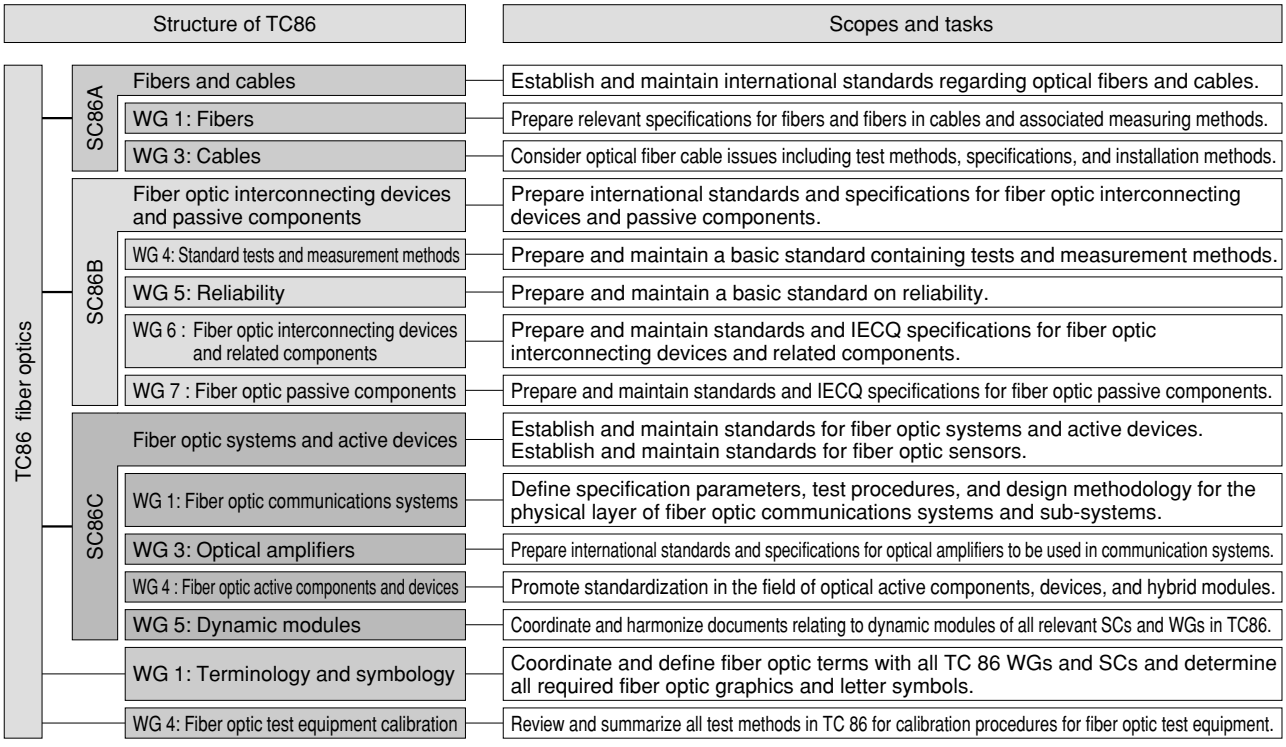

Fig. 2. Structure and technical fields of SCs and WGs in TC86.

Japanese delegate summarized their work on POF document allocation to the appropriate WGs. Detailed specifications were also proposed for industrial premises cable, which is related to the environmental requirements of mechanical, ingress, climatic, or electromagnetic (MICE) characteristics to provide users with an environmental classification.

SC86B/WG4

This meeting discussed mode power distribution (MPD) specifications and other issues related to multimode optical fiber. The Japanese delegation described recently reported OITDA (Optoelectronic Industry and Technology Development Association) specifications and standardization activities in con-

Table 1. International standards specified in TC86.

International Standard Number	Item
IEC 60793	Optical fibers
IEC 60794	Optical fiber cables
IEC 60869	Fiber optic attenuators
IEC 60874	Connectors
IEC 60875	Fiber optic branching devices
IEC 60876	Fiber optic spatial switches
IEC 61073	Splices for optical fibers and cables
IEC 61202	Fiber optic isolators
IEC 61274	Fiber optic adaptors
IEC 61300	Test and measurement
IEC 61313	Fiber optic passive components
IEC 61314	Fiber optic fan-outs
IEC 61753	Fiber optic interconnecting devices and passive components performance standard
IEC 61754	Fiber optic connector interfaces
IEC 61755	Fiber optic connector optical interface
IEC 61756	Fiber management system
IEC 61977	Fiber optic filters
IEC 61978	Fiber optic passive dispersion compensators
IEC 62005	Reliability
IEC 62074	Fiber optic WDM devices
IEC 62077	Fiber optic circulators
IEC 62099	Fiber optic wavelength switches
IEC 62134	Fiber optic enclosures
IEC 61280	Fiber optic communication subsystem basic test procedures
IEC 61281	Fiber optic communication subsystems
IEC 61282	Fiber optic communication system design guides
IEC 61290	Optical amplifier test methods
IEC 61291	Optical amplifiers
IEC 61292 TRs	Optical amplifiers technical reports
IEC 61751	Laser modules used for telecommunication
IEC 61757	Fiber optic sensors
IEC 62007	Semiconductor optoelectronic devices
IEC 62148	Fiber optic active components and devices – Package and interface standards
IEC 62149	Fiber optic active components and devices – Performance standards
IEC 62150	Fiber optic active components and devices – Test and measurement procedures
IEC 62343	Dynamic modules

nection with tests and measurement methods for fiber optic interconnecting devices and passive components in the Japanese Standards Association (JIS). In addition, it was agreed to accept the Japanese proposal to merge the polarization phase shift method with the existing PMD measurement standard.

The results of a round robin test on the concentricity of APC (angled physical contact) connectors enabled working group members to understand the problem of accuracy.

SC86B/WG5

The structure of standards was discussed and it was agreed that existing documents will be separated into Technical Reports and Reliability Qualification Standards. It was also agreed that Reliability Qualification Standards will be specified for each product because of the different failure modes. The Japanese National Committee presented research results on reliability qualification obtained by JIS.

SC86B/WG6

There was considerable discussion about optical interfaces in relation to the document structure. A decision was reached about the parameters that should be specified and their specific values. A proposal on a multimode optical fiber interface from the US National Committee led to agreement to prepare a document for a New Work Item Proposal.

SC86B/WG7

In this meeting, it was agreed that Japanese proposal related to variable attenuators, circulators, isolators, and DWDM (dense wavelength division multiplexing) filters should proceed to the next stage. An additional proposal for a polarization dispersion compensator performance standard was made. With regard to a proposal on CWDM (coarse wavelength division multiplexing), it was agreed that a document will be prepared for a New Work Item Proposal. It was decided to proceed with discussions on the need for standardization with regard to three-wavelength WDM components for passive optical networks (PONs), optical fuses, and an optical power limiter.

SC86C/WG1

Regarding PMD issues, there was discussion about a guidance document on PMD theory and measurement and about the measurement of PMD on links. It was agreed to submit these documents to a balloting stage by reflecting the results of this meeting. With regard to the verification of PON links, the WG agreed that any project should take account of the existing ITU-T documentation and establish liaison relationships. The WG agreed to work toward a Technical Report outlining how one could combine the various aspects of source power and optical multiplexer/demultiplexer characteristics to verify the operability of a black link. The WG will work toward this goal in correspondence activities that will include ITU-T members.

SC86C/WG3

OA interfaces (command sets) that control the intelligent optical amplifiers used in optical network were discussed. It was agreed that discussion of the proposed revised document from the Japanese National Committee should be continued using teleconference systems. SC86C/WG3 agreed to add notes to the newly created or modified document under WG3 if electromagnetic compatibility seemed to be an issue.

SC86C/WG4

WG4 discussed the package and interface standards of 10-Gbit/s optical transceivers and related performance standards. WG4 decided to propose 10-Gbit/s transmitter sub-assemblies and receiver sub-assemblies as new work items. The issue of the overlap between TC86's technical fields and those of other TCs was discussed. To solve this problem, WG4 proposes establishing liaison between SC86C and such TCs. WG4 agreed to send a liaison officer from the Japanese National Committee.

SC86C/WG5

An ongoing document related to dynamic module reliability qualification and the single-mode fiber optic dynamic channel equalizer was discussed. It was agreed to submit it to the next stage. Two other documents proposed by Japan, relating to a single-mode fiber optic dynamic chromatic dispersion compensator and a dynamic gain tilt equalizer will be discussed after voting on a New Work Item Proposal. The Japanese National Committee made a presentation on the control interface and response time of a dynamic module, which was studied in JIS. The WG agreed to study this.

The Japanese National Committee also proposed that SC86C/WG5 handle the variable optical attenuator (VOA) module, the optical spatial switch module, and the tunable and wavelength switch module that had been discussed in SC86B/WG7.

5. Further standardization trends in IEC TC86

The optical industrial fields covered by IEC TC86 are likely to continue to be led by the USA and Japan. Technical trends in optical fiber, components, and devices with various applications are being studied for specification as international standards, thus encouraging progress and diversification, especially in the access network field.

References

[1] http://www.iec.ch/
[2] R. Nagase, “Trends in the International Standardization of Fiber Optic Interconnecting Devices and Passive Components,” NTT Technical Review, Vol. 2, No. 4, pp. 75-78, 2004.

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