IEEE Activities in the Area of Standards Education

IEEE-CNIS Standards Education Workshop

Moshe Kam
2010 IEEE President-Elect
IEEE Standards Education Committee

Beijing, China
27 May 2010

IEEE
Celebrating 125 Years
of Engineering the Future

Outline

- Context – where does Standards Education fit in IEEE?
- Standards Education at the University Level
- The current Standards Education Portal
- IEEE future Standards Search Portal
- Workshop and Symposia
- Possible participation by partners in China

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- **Context – where does Standards Education fit in IEEE?**
- **Standards Education at the University Level**
- **The current Standards Education Portal**
- **IEEE future Standards Search Portal**
- **Workshop and Symposia**
- **Possible participation by partners in China**

IEEE Board Structure

Board of Directors

Technical Activities Board

Publications Services and Products

Member and Geographical Activities

Standards Association

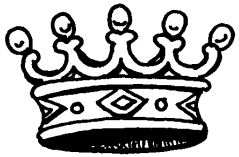
Educational Activities

IEEE-USA

IEEE Board Structure

Direction-setting, strategic planning and oversight over all IEEE major activities

Board of Directors



Technical Activities Board

Publications Services and Products

Member and Geographical Activities

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Educational Activities

IEEE-USA

Technical Activities

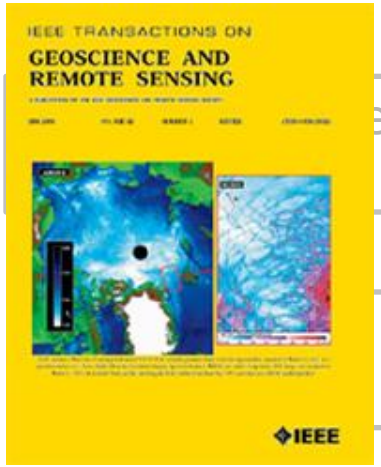
IEEE COMPUTER SOCIETY

IEEE

TAB Organization

Board of Directors

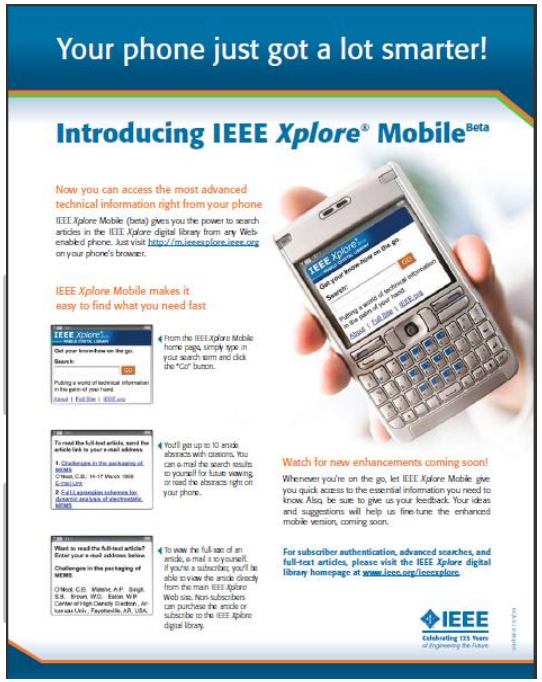
IEEE PES Power & Energy Society™

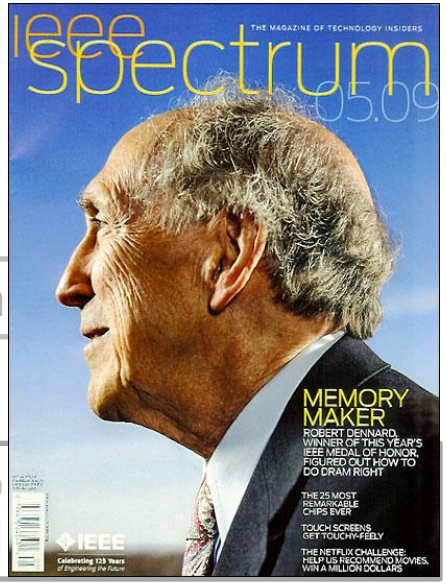


Initiation and coordination of technical activities, including IEEE technical societies, conferences and content development for IEEE publications

IEEE Celebrating 125 Years of Engineering the Future

Publications



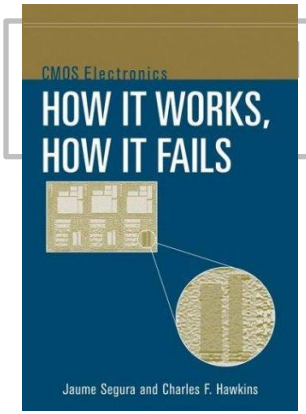


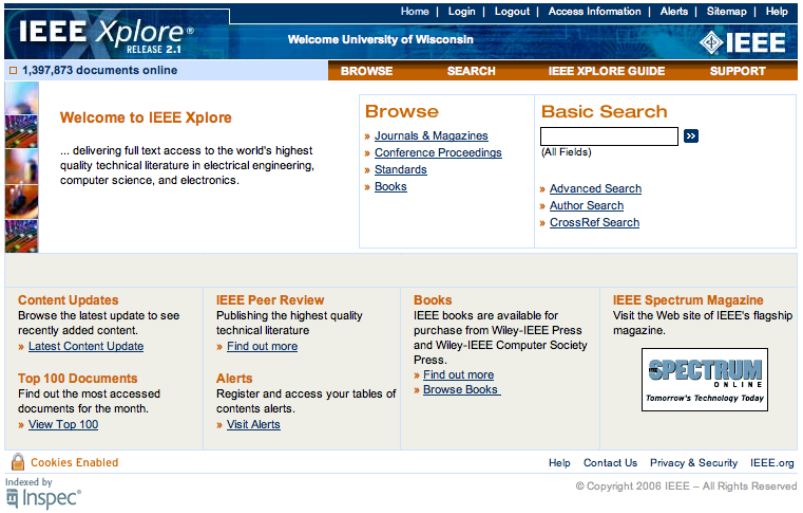
Boa

Pub
and

IEEE Xplore® RELEASE 2.1

Member and Geographical Activities





Production and dissemination of IEEE publications and other products

IEEE
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of Engineering the Future

Member and Geographic Activities

Educational Activities

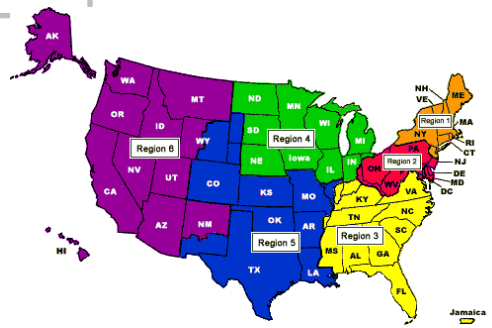
Management of geographical units such as local Sections and Student Branches

IEEE USA

Association

Activities

IEEE-USA



Professional activities for members in the United States

Public Policy

IEEE
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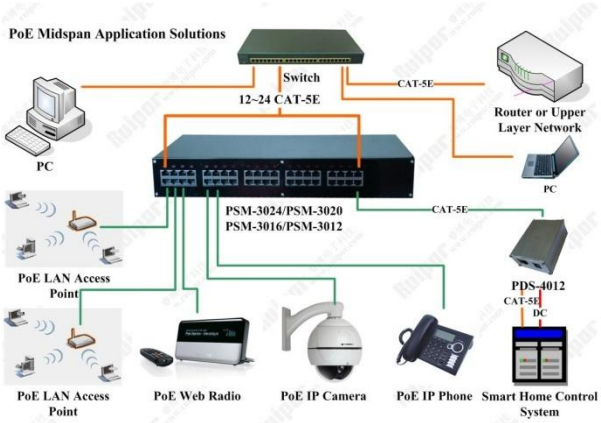
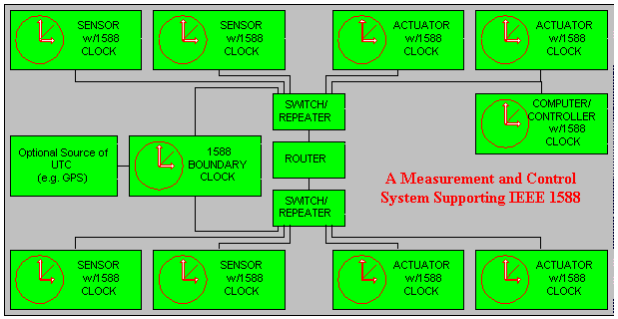
of Engineering the Future

Standards

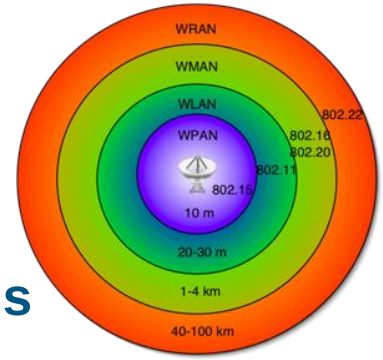


Standards Association

IEEE 802 Standards	
802.1	Bridging & Management
802.2	Logical Link Control
802.3	Ethernet - CSMA/CD Access Method
802.4	Token Passing Bus Access Method
802.5	Token Ring Access Method
802.6	Distributed Queue Dual Bus Access Method
802.7	Broadband LAN
802.8	Fiber Optic
802.9	Integrated Services LAN
802.10	Security
802.11	Wireless LAN
802.12	Demand Priority Access
802.14	Medium Access Control
802.15	Wireless Personal Area Networks
802.16	Broadband Wireless Metro Area Networks
802.17	Resilient Packet Ring



Development, maintenance and dissemination of technical standards



	802.16	802.16a	802.16e
Spectrum	10 – 66 GHz	2 – 11 GHz	<6 GHz
Configuration	Line of Sight	Non- Line of Sight	Non- Line of Sight
Bit Rate	32 to 134 Mbps (28 MHz Channel)	≤ 70 or 100 Mbps (20 MHz Channel)	Up to 15 Mbps
Modulation	QPSK, 16-QAM, 64-QAM	256 Sub-Carrier OFDM using QPSK, 16-QAM, 64-QAM, 256-QAM	Same as 802.16a
Mobility	Fixed	Fixed	≤75 MPH
Channel Bandwidth	20, 25, 28 MHz	Selectable 1.25 to 20 MHz	5 MHz (Planned)
Typical Cell Radius	1-3 miles	3-5 miles	1-3 miles
Completed	Dec, 2001	Jan, 2003	2nd Half of 2005

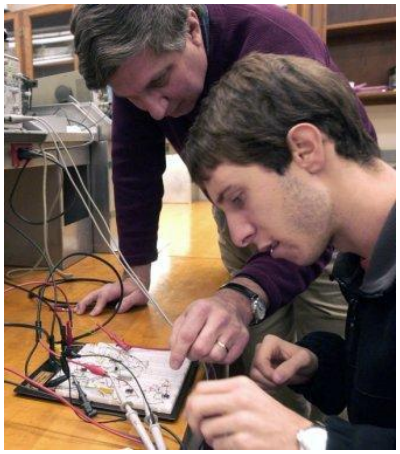
Education

TryEngineering

ACCREDITATION

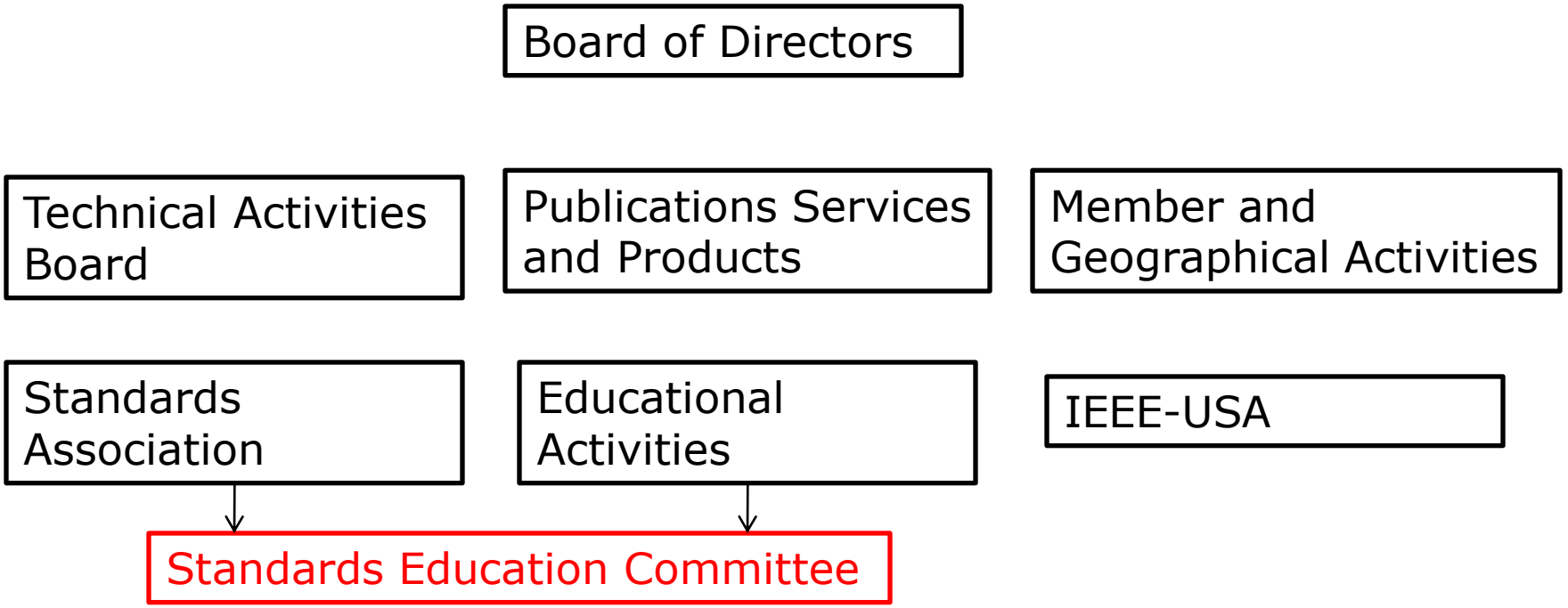
Educational Activities

IEEE-USA



Coordination and development of educational programs in IEEE's fields of interests

IEEE Board Structure



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What is IEEE trying to achieve in the area of Education?

- **Provide members and other professionals involved in IEEE's technical fields of interest with high quality opportunities for education in these fields**
- **Provide young people, and their teachers and parents, with opportunities to understand career paths in engineering and technology**
- **Provide the profession's perspective on all key aspects of higher education in IEEE technical fields of interest**

Four areas of interest

Pre-university Education

University-level education

Continuing (post-university) Education

Public understanding of Engineering Computing and Technology

Four areas of interest

Pre-university Education

University-level education

Standards Education

Continuing (post-university) Education

Public understanding of Engineering Computing and Technology

University-level Educational Activities

- **Objectives:**
  - **Improve academic curricula and ensure their purposeful adaptation to the changing technical and business climate**
  - **Improve delivery and effectiveness of engineering education**
  - **Improve retention of engineering and technology students**

University-level Educational Activities

Standards Education

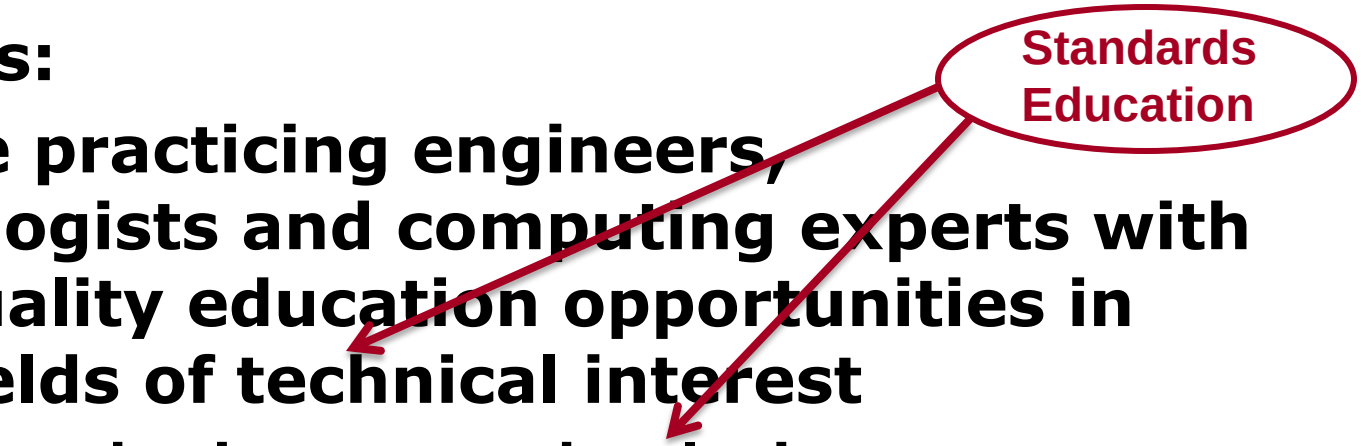
- **Objectives:**
  - **Improve academic curricula and ensure their purposeful adaptation to the changing technical and business climate**
  - **Improve delivery and effectiveness of engineering education**
  - **Improve retention of engineering and technology students**

Continuing Education Activities (Post University)

- **Objectives:**
  - **Provide practicing engineers, technologists and computing experts with high quality education opportunities in IEEE fields of technical interest**
    - **With emphasis on new, developing areas**
  - **Provide opportunities for certification in emerging fields**

Continuing Education Activities (Post University)

- **Objectives:**
  - **Provide practicing engineers, technologists and computing experts with high quality education opportunities in IEEE fields of technical interest**
    - **With emphasis on new, developing areas**
  - **Provide opportunities for <u>certification</u> in emerging fields**



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- Workshop and Symposia
- Possible participation by partners in China

Managing Body: IEEE Standards Education Committee (SEC)

- A committee of IEEE volunteers with interest in Education and in IEEE standards
  - Supported by IEEE Staff
  - Meets approximately every two months
    - face to face or by teleconference

- Funded by IEEE member dues

- From time to time – funded by external associations and agencies
  - Most active funder: the US National Science Foundation

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Mission of the Standards Education Committee (1)

1. **Promote the importance of standards in meeting technical, economic, environmental, and societal challenges**

2. **Secure and disseminate learning materials on the application of standards in the design and development aspects of educational programs.**

3. **Secure and provide short courses about standards needed in the design and development phases of professional practice.**

Mission of the Standards Education Committee (2)

4. **Actively promote the integration of standards into academic programs.**

5. **Lead other education initiatives planned jointly by the IEEE Educational Activities Board and the Standards Association.**

Who benefits?

Undergraduate Students	
Graduate Students	
Entry-level technology professionals	
Candidates for licensure	
Experienced technology professionals	– **Standards developers** – **Product developers** – **Standards managers**
Marketing professionals	
Business leaders	
Standards Organizations	– **Committee leaders** – **Committee participants** – **Governance participants**

The use of Standards in high education…

- About 450 universities worldwide have on-line access to IEEE standards
  - Including schools in China
- Only 8-10 universities make use of this feature at present (!)
- Standards are mentioned in the program criteria of the US-based accreditation agency ABET
  - but in general use of Standards in most curricula is sparse

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IEEE Standards Education on the Web

- **IEEE Standards Education Portal**
  http://www.standardseducation.org

- **Focal point for delivery of information on education about standards**

- **Content is freely available**
  - **Developed with the support of a US National Science Foundation Grant**

IEEE
Advancing Technology for Humanity

The world's largest professional association for the advancement of technology

Standards Education

As the world's leading standards developer, IEEE is also a leading source of information and resources on standards, their applications, and their impact on designing new products, processes, and services.

More Standards Information

- Global Survey on The Strategic Value of Standards Education (PDF, 471 KB)
- ANSI Standards Education
- Asia-Pacific Economic Cooperation (APEC) Standards Education
- IEEE Standards Information Network

Commitment to standards education

IEEE is committed to:

promoting the importance of standards in meeting technical, economic, environmental, and societal challenges;

disseminating learning materials on the application of standards in the design and development aspects of educational programs;

- actively promoting the integration of standards into academic programs;
- providing short courses about standards needed in the design and development phases of professional practice.

top of page

Objectives

- **To support the incorporation of the teaching of standards in undergraduate programs**
  - **engineering and engineering technology**
- **To help undergraduate programs incorporate standards in their learning processes**
- **To benefit students and faculty mentors who face challenging design processes**
- **To provide learning tools**
  - **learning about standards and their impact on design and development**

http://www.standardseducation.org

IEEE Standards in the Classroom

- **Standards Education Menu**
- Standards Education Home
- Purpose of Standards Education
- Standards in the Classroom
- Tutorials
- Case Studies
- Student Application Papers
- Standards Reference Directory
- Glossary
- Announcements
- Additional Resources

IEEE encourages the introduction and use of standards in the classroom. Your educational institution may have access to all IEEE Standards through the IEEE's Xplore Digital Library, which provides access to IEEE journals, transactions, letters, magazines and conference proceedings, IET journals and conference proceedings, IEEE Standards and IEEE educational courses.

› Educational institutions with access to IEEE Standards (PDF, 540 KB)

If your school appears on our list, contact your school's librarian for subscription access and for more information. Please visit IEEE *Xplore* ® to access your subscription (username & password required).

No-cost access to IEEE 802® Standards

The *Get IEEE 802*® program makes IEEE 802 standards available at no charge in PDF format thanks to industry sponsorship. This program grants public access to view and download current individual IEEE Local and Metropolitan Area Network standards at no charge.

- New IEEE 802® standards will be included in the program after they have been published in PDF for six months.
- All documents available in the *Get IEEE 802*® program will remain in the program until they are replaced by a superseding document or they are withdrawn.

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What do you want to do?

- Find a standard
- Shop for standards
- Subscribe to standards
- Search standards projects
- Sign up for standards publication alerts
- Learn more about standards development
- Log-in and ballot on a standard
- Get IEEE 802® standards

Tutorials

» Read More

Standards Education Tutorials

- **Tutorials are free online comprehensive learning modules**
- **Provide guidance on how to assemble and apply standards appropriate to the development of a product or process**
- **Representative modules:**
  - **The Role of Standards in Engineering and Technology**
  - **The Role of Standards in Cellular Telephony**
  - **The Role of Standards in Electrical Power Systems**
  - **SystemVerilog (IEEE Std 1800™-2005)**

Standards Education Case Illustrations

- **Case Illustrations are examples of the application of standards in a real-world context**
  - **Wireless Routers**
  - **Multimode Mobile Phones**
- **New tutorials…**
  - **Tutorials and Case Illustrations on Metric Units**
  - **Tutorial on Intellectual Property**
  - **Tutorial on IEEE Std 802.16**
- **More are being developed**

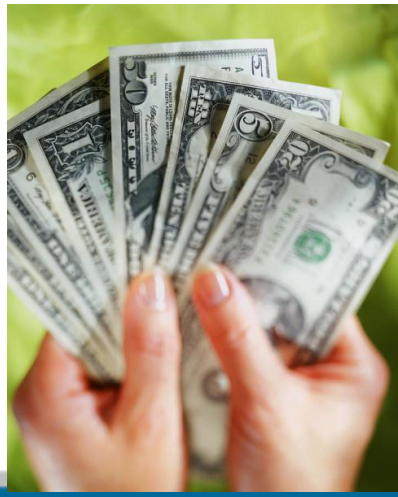
Snapshot of Tutorial

http://www.ieee.org/web/education/standards/tutorials.html

IEEE Mini-Grants and Student Application Papers

- **SEC is offering Mini-Grants to students and faculty mentors**

- **Help with graduate and undergraduate last-year design projects that contain an industry standards component**
  - **$500 grants for students**
  - **$300 grants for faculty advisors**



IEEE Mini-Grants and Student Application Papers

- **Projects must illustrate how specific standards were applied to a task in the classroom**
- **students and/or faculty describe how standards impacted the design process**
- **Results are published as Student Application Papers**
  - **http://standardseducation.org/applications**

Final student papers are now posted on the following topics:

- Applications of IEEE 802.11b Wireless Standards in the Realization of a New Service Paradigm for New Jersey's Garden State Parkway
- Dynamic Backoff for IEEE 802.15.4 Beaconless Networks
- Wireless Body Area Networks for Healthcare: A Feasibility Study
- Wireless Wearable Motion Sensor for Use in Medical Care
- Environment Temperature Control Using Modbus and RS485 Communication Standards
- Wireless Telemedicine as Part of an Integrated System for E-medicine
- Build an IEEE 802.15.4 Wireless Sensor Network for Emergency Response Notification for Indoor Situations
- http://standardseducation.org/applications

IEEE Standards Education Web Site: the Remaining Sections

- Glossary of key standards terms
- Reference Guide
- Alphabetical listing of standards development bodies and standards-related terminologies
- News and Features
- Gateway to other learning opportunities

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IEEE GLOBAL STANDARDS PORTAL

Principal Objectives

- **Create a popular IEEE portal for practitioners, about all technical Standards in IEEE's Technical Fields of Interest**
  - **A "One Stop Shop" for Standards**
- **The portal would allow search for ALL available resources on standards education**
- **The portal would allow for search for all publicly available standards in IEEE Technical Fields of Interest**
  - **Expansion of http://www.ieee.org/web/standards/home/find.html**

By developing this portal, IEEE will…

(1) Provide a service to its members and the profession which currently does not exist

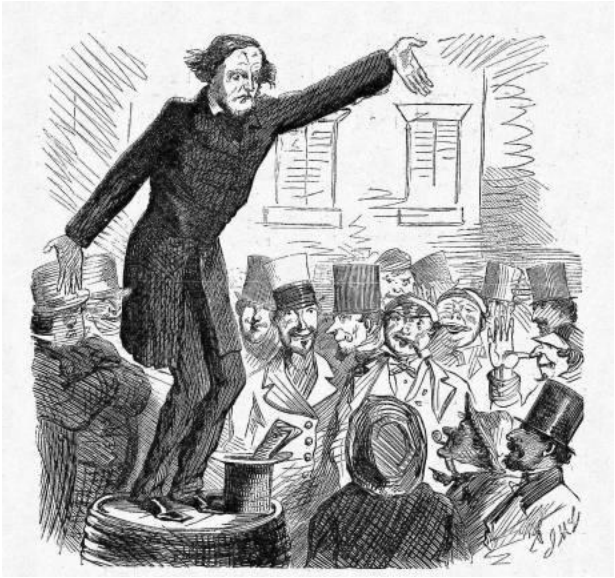
(2) Increase interest in IEEE standards and the IEEE Standards Association

(3) Establish IEEE's leading role in the area of standards

The Final Product

- **An open access portal for public use**
- **Search by key words, topics, and standard numbers/titles**
  - **For all available educational material**
  - **For all available standards**
    - **User may be able to proceed from the landing page to purchase educational material or standards**
    - **Not limited to English or English sites**
      - **Though mostly in English**

Standards Education



WORKSHOPS AND SYMPOSIA

IEEE Standards Education Workshops

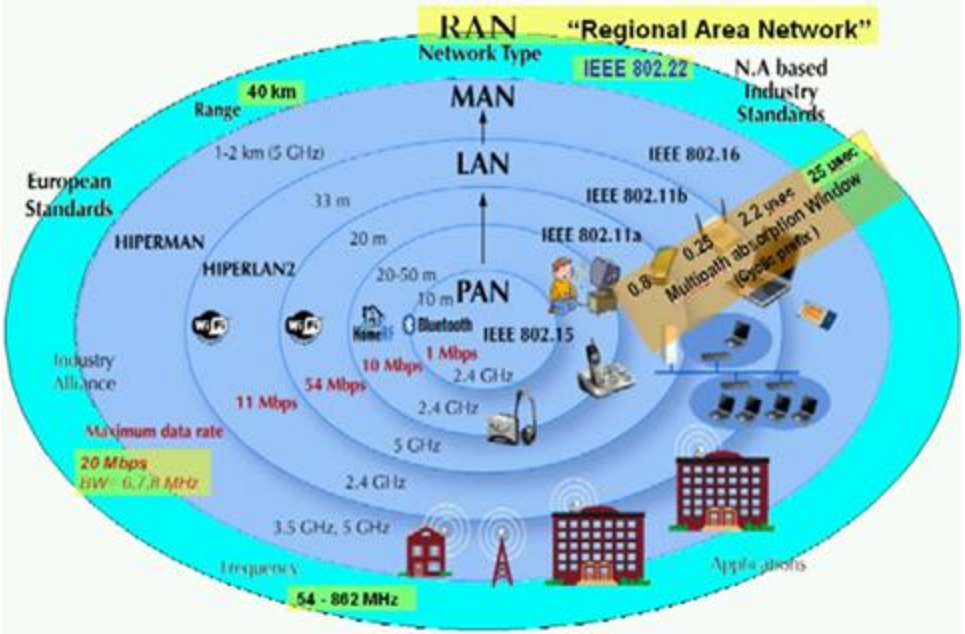
- **Targeted at practicing professionals as part of IEEE's continuing education efforts**

- **First workshop: November 2007 in Globecom**
  - **On IEEE 802 Wireless Standards**

- **Second workshop: November 2009**
  - **IEEE 802 Standards**
  - **intellectual property**
  - **standards process**
  - **include panel discussion on the value of standards**

Workshop content

- **"A full day of immersion into the world of IEEE 802® Standards and cover each of the working groups developing standards in both the wired and wireless areas"**



IEEE Educational On-line Modules about Standards

Title	Presenter
Home Networking Standards	Marie-José Montpetit
Introduction to IEEE 802	Todor Cooklev
Introduction to IEEE 802.11	Todor Cooklev
Introduction to IEEE 802.15	Todor Cooklev
Introduction to IEEE 802.16	Todor Cooklev
Introduction to IEEE 802.11n* Physical Layer	Eldad Perahia
Introduction to IEEE 802.11n MAC Layer	Robert Stacey

One-hour modules available for rental through the IEEE Expert Now Program

Local IEEE Sections in China can access for educational purposes

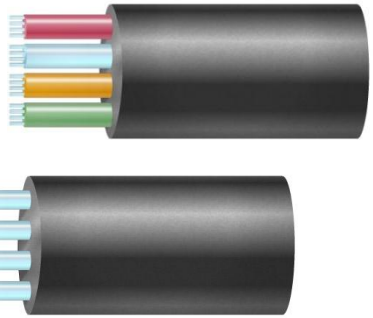
Expert Delivered Demonstration - Microsoft Internet Explorer

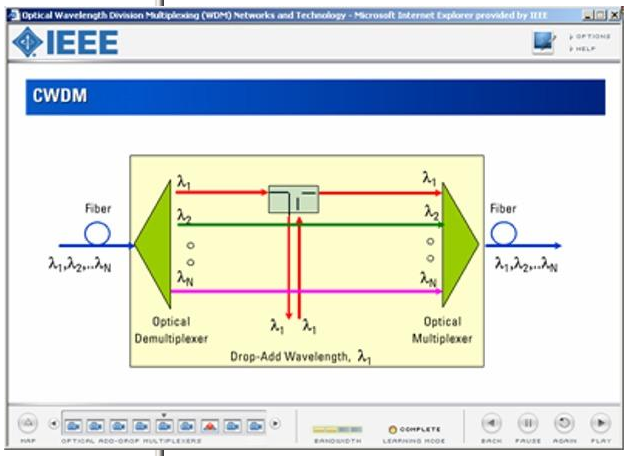
IEEE

2003 IEEE Conference on Optical Fiber Communication

Reconfigurable Multiple Wavelength Optical Systems and Networks

Introduction > About This Course





IEEE LEOS
LASERS & ELECTRO-OPTICS SOCIETY

This course has been sponsored by the IEEE Laser and Electro-Optics Society.

Alan Eli Willner
University of Southern California

MAP | ELECTROMAGNETISM AND LIGHT | BANDWIDTH | COMPLETE LEARNING MODE | BACK | PAUSE | AGAIN | AUTO | PLAY

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IEEE Standards Education
How Chinese Programs can participate

- Consider integrating the IEEE Standards Education web portal in existing academic programs
- Discuss with IEEE the possibility/desirability of translation of the IEEE portal into Chinese
- Discuss with IEEE Standards Education Portal topics that may be beneficial to educational programs in China

http://www.standardseducation.org

Additional opportunities

- **Coordinate with IEEE presentations by Standards Guest Lecturers**
  - **At colleges, universities, or companies**
- **Propose topics for relevant new on-line Tutorials and Case Studies for students and educators**
- **Consider active participation in the IEEE Standards Education Committee activities**
- **Participate as a content provider/partner**

Past Cooperation between IEEE and Chinese Education Associations (CAST)

Additional Information

- **Website**
  http://www.standardseducation.org

- **IEEE President-Elect**
  - **Moshe Kam, m.kam@ieee.org**

- **Standards Association president-Elect**
  - **Steve Mills, steve_mills@hp.com**

- **Standards Education Committe Chair**
  - **David Law, David_Law@3com.com**

- **IEEE Standards Education Program Manager**
  - **Jennifer McClain, j.mcclain@ieee.org**

Questions or Comments