The Institute of Electrical and Electronics Engineers
Past, Present, and Future

Presented by:
Bob Shapiro
IEEE Communications Society
Director of Marketing and Industry Relations
The Institute of Electrical and Electronics Engineers
Past, Present, and Future

125 Years of Electrical Engineering and Beyond
(Including Telecom)
Otto von Guericke
L’Electrissee Machine 1663
Pieter van Musschenbroek of Leyden
Leyden Jar 1746
Benjamin Franklin
Kite Experiment - 1752
Luigi Galvani
Frog Leg Experiment 1780
Alessandro Volta
Volta Pile 1799
Andre Ampere
Ampere Law - 1820
Georg Simon Ohm
Ohm's Law 1827
Joseph Henry
Electromagnet 1829
Michael Faraday
Induction Ring 1832
Samuel Hunter Christie
Christie’s Bridge - 1833
Charles Wheatstone
Telegraph 1837
Samuel Morse
Morse Code 1844
Trans-Atlantic Telegraph 1858

The Great Eastern
Alexander Graham Bell
Telephone 1876
Thomas Edison
Light Bulb 1879
Edison Electric
First Electric Utility Power System 1882
INTERNATIONAL ELECTRICAL EXHIBITION 1884
OF THE FRANKLIN INST. PHILADELPHIA, PA.
TO OPEN TUES. SEPT 1884
TO CLOSE SAT. OCT. 11 1884

IEEE COMMUNICATIONS SOCIETY
www.comsoc.org
American Institute of Electrical Engineers

• Nathaniel S. Keith drafted and placed a call in the April 15, 1884 issue of “The Operator”
  – The call endorsed by twenty-five prominent figures in electrical technology including Thomas Edison, Elihu Thomson, Edwin Houston, and Edward Weston
• May 13th, 1984 - Electrical practitioners met at the American Society of Civil Engineers headquarters in New York to form the American Institute of Electrical Engineers
• 1st President - Norvin Green, president Western Union Telegraph
• 1st First Secretary - Nathaniel Keith
• 1st Treasurer Rowland R. Hazard – elected
• Six Vice-Presidents:
  – Alexander Graham Bell, Charles D. Cross, Thomas A. Edison, George A. Hamilton, Charles H. Haskins, and Franklin L. Pope
American Institute of Electrical Engineers

• First AIEE technical session
  – Philadelphia Exhibition - October 7-8, 1884
    • Franklin Institute
    • Paper published in the first issue of the Transactions of the AIEE
      – "Notes on Phenomena in Incandescent Lamps," by Edwin Houston
        » "Edison Effect," became the foundation of electronics

• AIEE developed standards for the engineering profession and the electrical industry
  – Earliest efforts directed toward standardizing units, definitions, and nomenclature relating to basic electrical science
  – First action - adopted the name “Henry" for the practical unit of inductance in 1890
AC vs. DC Wars - 1887
Heinrich Hertz
First Radio Wave 1888
Guglielmo Marconi
First Transatlantic Wireless Communications 1901
James Maxwell
Inventor of Radio
Alexander Popov
Inventor of Radio
American Institute of Electrical Engineers

• 1902
  – First AIEE Local Sections established
    • Chicago, IL and Ithaca, NY
  – First AIEE Student Branches
    • Lehigh University

• 1903
  – First Local Section outside the U.S.
    • Toronto, Canada
  – Technical Committee
    • The High Voltage Transmission Committee
John Fleming
Valve Diode - 1904
Reginald Fessenden
First AM Broadcast - 1906
Institute of Radio Engineers

• AIEE oriented to electrical power and telecommunication industries
• Society of Wireless Telegraph Engineers was started in Boston by John Stone – 1907
  – SWTE membership initially limited to employees of Stone Wireless Telegraph Company
    • Membership later opened to employees from Reginald Fessenden’s National Electric Signaling Company
  – The Wireless Institute started in New York by Robert Marriott – 1909
• SWTE & The Wireless Institute merge 1912
  – Institute of Radio Engineers established by merger
  – By explicitly excluding the word "American," the radio engineers were attempting to become an international society
Institute of Radio Engineers

- First issue of the Proceedings of the Institute of Radio Engineers was published in January 1913
- The report of the first Standardization Committee, published in 1913
- IRE reflected the growth of the radio industry
  - Prior to World War I, maritime radio was the most important segment of the industry
    - 1917 - Local Sections
      - Washington, DC
      - Boston
      - Seattle
      - San Francisco
  - Post-war years Domestic broadcasting became more important
    - 1925 – Local Sections – Philadelphia; Chicago; Toronto
    - 1933 – Local Sections – New Orleans
Institute of Radio Engineers

- 1920-30 - IRE began coordinated standards activities with radio and electrical trade associations
  - National Electrical Manufacturers Association
  - Radio Manufacturers Association
  - Federal Government
    - development of regulations for the broadcasting industry
    - 1927 - Federal Radio Commission
John Bardeen, Walter Brattain, and William Shockley
Transistor - 1947
Institute of Radio Engineers

• 1948 IRE and the Radio and Television Manufacturers Association formed the Joint Technical Advisory Committee
  – Topics
    • FM broadcasting
    • Television interference
    • Standards of good engineering practice

• IRE worked with the National Television System Committees on Standards
  – Commercial black-and-white television service
  – Color television
1962 IRE and AIEE Membership Numbers

<table>
<thead>
<tr>
<th>Year</th>
<th>IRE</th>
<th>AIEE</th>
</tr>
</thead>
<tbody>
<tr>
<td>1947</td>
<td>18,000 members</td>
<td>26,500 members</td>
</tr>
<tr>
<td>1957</td>
<td>55,500</td>
<td>50,000</td>
</tr>
<tr>
<td>1962</td>
<td>96,500</td>
<td>57,000</td>
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</tbody>
</table>
IRE and AIEE Merge to form IEEE – January 1, 1963
IEEE Membership By Region*

TOTAL MEMBERSHIP 2008 Yr End – 376,328

R1 to 6 – 212,838
- R1 – 37,973
- R2 – 32,363
- R3 – 30,782
- R4 – 23,555
- R5 – 29,020
- R6 – 59,145

R7 – 15,947

R8 – 64,976

R9 – 15,410

R10 – 67,157

Reflecting the global nature of IEEE, R10 and R8 are now the two largest IEEE Regions
IEEE Societies & Councils

- 38 Societies and 6 Technical Councils
- Bringing members together with similar interests
- Sponsoring conferences, workshops tutorials, seminars, etc
- Developing publications: Journals, Magazines, Newsletters
- Recognizing member accomplishments
IEEE Societies & Councils

- Aerospace & Electronic Systems
- Antennas & Propagation
- Broadcast Technology
- Circuits & Systems
- Communications
- Components, Packaging & Manufacturing Technology
- Computational Intelligence
- Computer
- Consumer Electronics
- Control Systems
- Dielectrics & Electrical Insulation
- Education
- Electromagnetic Compatibility
- Electron Devices
- Engineering in Medicine & Biology
- Geosciences & Remote Sensing
- Industrial Electronics
- Industry Applications
- Information Theory
- Instrumentation & Measurement
- Intelligent Transportation Systems
IEEE Societies & Councils

- Lasers & Electro-Optics
- Magnetics
- Microwave Theory & Techniques
- Nuclear & Plasma Sciences
- Oceanic Engineering
- Power Electronics
- Power Engineering
- Product Safety Engineering
- Professional Communication
- Reliability
- Robotics & Automation
- Signal Processing
- Social Implications of Tech.
- Solid-State Circuits
- Systems, Man, & Cybernetics
- Ultrasonics, Ferroelectrics & Frequency Control
- Vehicular Technology

6 Technical Councils
- Electronic Design Automation
- Nanotechnology
- Sensors
- Super Conductivity
- Systems
- Technology Management
New Technology Working Groups

- Biometrics
- Digital Intellectual Property
- Earth Observation
- Power and Alternative Energy Technologies
- RFID
- Biotechnology and Bioengineering
- Distributed Intelligent Networks and Systems
- Organic Electronics
- Portable Information Devices
IEEE Publications

IEEE SPECTRUM Magazine
In print and online

New Online Features:
• Spectrum Radio
• Webcasts
• RSS Feeds
• Blogs
The IEEE Standards Association

A World Leader in Standards Development

Fostering Technological Innovation

• The leading developer of global industry standards in a broad-range of industries, including: Power and Energy - Biomedical and Healthcare - Information Technology – Telecommunications – Transportation – Nanotechnology - Information Assurance – Battery Technology

• IEEE-SA offers an established standards development program that features balance, openness, due process, and consensus.
Continuing Education

IEEE Expert Now

• More than 65 one-hour interactive online courses in IEEE’s technical areas of interest

• Subscriptions available for Corporate, University, Government and Individual Members

• Earn Continuing Education Units (CEUs) and Professional Development Hours (PDHs)

IEEE Education Partners Program

• Online courses offered from university and corporate institutions at a discount
Building the Pipeline of Professionals

IEEE Pre-University Programs connect engineers and educators

Pre-University Teacher In-Service Program (TISP) for Sections

- Features IEEE volunteers developing and presenting technical subject matter to pre-university educators in a professional development setting
- Over 325 IEEE volunteers were trained in 2007, representing 16 countries
- 42 lesson plans aligned with education standards are available
- Overall, more than 1800 teachers have participated in a TISP session led by an IEEE volunteer - impacting over 180,000 students.
Access to Information

IEEE.org Web site

- “What do you want to do?” links for easy access to popular content
- 10 portals organize major content areas
- 24/7 access to IEEE products, services and information
- Ongoing usability testing to inform content and design updates
India

• GDP growth rate is among the fastest in the world, and investment, both domestic and foreign, contributes over 20% of GDP.

• India is in the midst of a demographic transition with a rising proportion of its population of ‘working age’ (15-59 years).

• The country is known for software development and growth in knowledge-based industries, as well as a center for the outsourcing of services.

Source: National Association of Software and Service Companies (NASCOM)
China

- China has come of economic age [Business Week Online, Nov 2004]


- China's strong economic growth is driven by a continuing surge in foreign direct investment. Today, more than 400 of the world's 500 biggest companies have a China presence. [Institutional Investor, Sept 2004]

- China’s educational system—according to it’s Ministry of Education— has:
  - 1,984 higher education institutes
  - 3.35 million higher education students with an additional 270,000 enrolled for post-graduate study
  - 400,000 Chinese nationals studying overseas

- China’s use of electronic media has exploded. In 1997, 620,000 people in China had Internet accounts and in 2002 that figure stood at 59.1 million. This puts China second in the world for Net connectivity. China may pass the United States in the number of Internet users within two years; it already leads the world in cell phone users.

Source: Business Week, Mar 2004
IEEE Membership*

Regions 1-6 vs 7-10

Total Reg. 1-6 Members

Total Reg. 7-10 Members
Today, the forces of global economic integration and advances in technology are creating a different and more complex challenge. [NII Innovate America, 2004]

Fully one-third of the world's population will be online within a decade. [The Futurist, Jul-Aug 2004]

15 years from now the majority of the world may be connected to the Internet. [United Nations, Nov 2004]
IEEE Focus on the Future: 9 Strategic Objectives

- Evaluate alternative membership models that are affordable and attractive
- Aggressively position IEEE as a leader in Standards in the global marketplace
- Transform IEEE into a highly respected provider of continuing and professional education products, services and activities
- Protect IEEE’s high value IP products from threats derived from alternative publishing business models such as open access
- Make IEEE a highly visible force in global accreditation, certification, and competency demonstrations
IEEE Must Focus On…

Enabling technical professionals to distinguish themselves in a globally competitive environment.

And aggressively deliver value-added products and services to support this strategic focus.
Thank you...

A special credit to David Pierce, IEEE Region 5 Director, for his role in preparing this presentation