



**IEEE Communications Society**  
**Wireless Communication Engineering Technologies**

# **Wireless Communications Engineering Technologies WCET**

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**IEEE Communications Society**  
**Wireless Communication Engineering Technologies**

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# About WCET Certification

- **Created by the IEEE Communications Society to:**
  - **Address the continuing education needs of wireless communications engineers**
  - **Help meet the wireless industry's need for qualified engineers**
- **IEEE WCET Certification effectively measures skills and knowledge used in contemporary practice**



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# Industry Trends

- Wireless/Satellite Communications highlighted as an area that will see explosive growth over the next decade.

Source: GOLDSEA Asian American Daily Career Report (2007)

- “Rapid growth in RF product development should result in opportunities for experienced individuals that have hands-on experience developing products. All indicators point to continuing strong requirements for RF engineers that are keeping their skills current.”

“Employment of RF engineers is expected to increase much faster than the average for most non-engineering and engineering occupations - as companies continue to adopt and integrate new technologies.”

Source: EngineerSalary.com

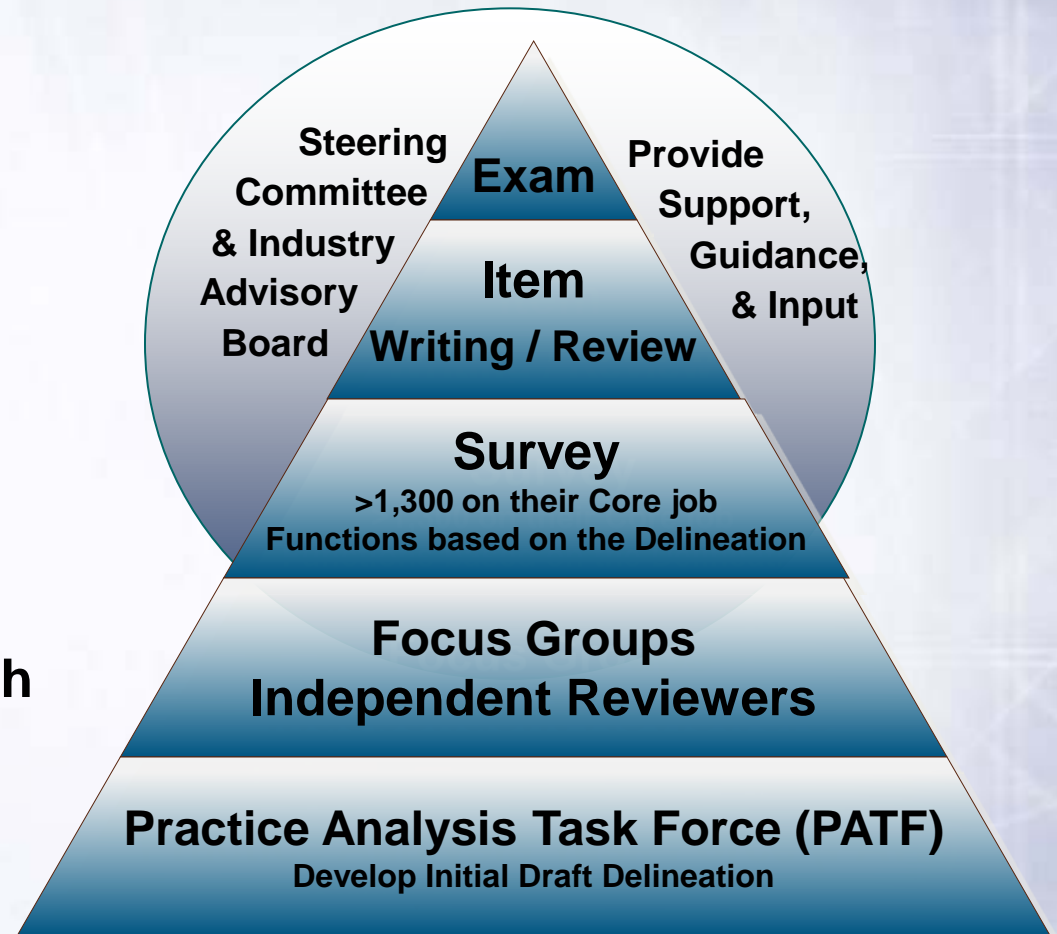


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# • Brief Program Review

- **Customers:** Potential certificate holders and the companies that employ them.
- **Demographic:** The 3+ year engineering practitioner, with a degree in EE or a related discipline.



# Subject Areas Covered

**The exam's 150 questions measure knowledge and skill in seven wireless communications areas:**

- **RF Engineering, Propagation, and Antennas**
- **Wireless Access Technologies**
- **Network and Service Architecture**
- **Network Management and Security**
- **Facilities Infrastructure**
- **Agreements, Standards, Policies, and Regulations**
- **Fundamental Knowledge**





# Who Qualifies?

- **IEEE WCET Certification is primarily designed for engineers who, at a minimum:**
  - **Hold a bachelor's degree from an accredited institution - and**
  - **Have at least three years of wireless engineering experience**
- **Those who are working in other engineering areas and want to make a switch to the wireless field**



# Benefits for Employers

**With IEEE WCET Certified Engineers, employers or future employers can easily:**

- **Identify properly skilled and qualified engineers for wireless engineering assignments**
- **Screen potential job candidates/applicants**
- **Assess their suitability to meet specific needs**

**For Employers, the IEEE WCET Certification:**

- **Creates a standard for the industry as to what is expected from a certified wireless professional**
- **Reduces the amount of in-house training an organization may need to develop for their engineers, saving them...**
- **Time - Money - Resource Allocations**



# International Perspective

**IEEE WCET Certification is based on technology and applications and NOT a specific company's approach.**

**WCET is a wireless certification at the "international level"; It recognizes the holders as "internationally certified". It adds business value when the Telecom-Administrations have its employees certified by WCET, to interact with international counterparts, either in negotiation or in exchange of technologies, equipments, standards, or regulatory concerns.**

**Certified engineers have demonstrated a thorough understanding of different key technologies in the wireless arena, local market implications of wireless communications, and new technology & standards development.**



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# Development & Review

- **Multiple groups of wireless professionals have overseen the development and review of the WCET Certification Program**
  - Practice Analysis Task Force (PATF)
  - Industry Advisory Board (IAB)
  - Question writers & Exam Creation
  - Candidate's Handbook
  - Training guidelines
  - Marketing
  - IT (registration, exam distribution, records)
- **Over 100 industry experts have actively contributed**
- **Over 1,300 have reviewed and validated the description of wireless engineering practice**



# Core Team Members



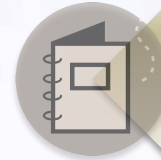
**Rulei Ting**  
Item Writing



**Mark Karol**  
IT



**Eesa Bastaki**  
Policy



**A. Ravikiran**  
Handbook



**Allen Levesque**  
Exam Creation



**Ricardo Veiga**  
Training Guidelines



**Elena Neira**  
WCP Liaison



**Peter Wills**  
Strategy



**Mike Kincaid**  
Marketing



**Andrzej Jajszczyk**  
WEBOK

**Metric: Active engagement – Meeting Schedules**



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# Exam Dates & Locations

- **Examinations:**
  - **Four-hour, 150-question multiple-choice exam**
  - **Given at secure computer-based test centers worldwide**
  - **Available at more than 500 testing sites located in 75 countries**
- **You arrange a specific exam appointment time during the exam window dates**
- **Visit [www.ieee-wcet.org](http://www.ieee-wcet.org) for:**
  - **Dates of upcoming exams**
  - **Application Period: 6 July - 4 September 2009**  
**Application Deadline: 4 September 2009**  
**Testing Window: 12 October - 31 October 2009**



# Current Status

- **Over 1000 items submitted & reviewed**
- **2 exams fully executed**
- **1 additional exam constructed**
- **Additional 400 questions reviewed**
  
- **Over 100 volunteers involved**
- **Over 30 active contributors**
- **Over 20 reviewers**



# Sample Comments from our first Certified Wireless Professionals

**“Very happy with the examination procedure....harder than I expected.... the WCP Certification greatly helps to communicate my capabilities to others; very important these days with so many engineers competing for so few opportunities. Equally as important, preparing for and maintaining the certification has been great for my continuing education and broadening my background. The certification procedure also helps me to understand my strengths and weaknesses in the field.”** *Chris Barroso, USA*

**“Started a consulting practice in wireless communications, specializing in point to point connections....I felt that this certification would give me some additional credibility with my clients.”** *Tom Lavrisa, Canada*

**“This exam truly tested the broader understanding of the wireless engineering profession....given me immense satisfaction and an objective assessment of the knowledge gained over the years. More importantly, I look forward to the comments on the areas where I have not performed well. This will help me understand where there is a gap in my understanding and endeavour to plug this gap.”** *Sivan Ramachandran, India*





# Sample Comments from our first Certified Wireless Professionals - continued

**“Anyone who obtains the WCET certification will have a deep understanding of the core principles for a wide range of wireless communication technologies....helps my career as a Consulting Engineer at Cisco by distinguishing me as someone who is a wireless expert and sets me apart from others who claim some level of wireless expertise. The WCET certification is valuable to my career as a means to certify to my customer’s that they are being advised by a certified wireless engineer. I consult to hundreds of customers annually, the WCET certification will help my Customers evaluate my expertise level in the wireless communications field and trust the services I provide.”** *Jeff Smith, USA*

**“I believe this certificate will be strong argument in my personal struggle for a new dream job position.”** *Dmitry Maskou, Korea*

**“I manage a team of engineers...I would likely use questions such as those posed in the WCET to filter out candidates....when the test becomes widely available, I would make hiring decisions based, at least in part, on WCET results.”** *Subramanian Vasudevan, USA*



- **Specific Initiatives and Metrics**
  - **Industry Advisory Board**
  - **Core team > 100 active volunteers**
  - **Wireless Engineering Body of Knowledge (WEBOK), Practice Exams, Handbook**
  - **Outreach**
  - **China Telecom Executives Briefing**
  - **Promotion / Education Initiatives**
  - **Chapters**



# Industry Advisory Board

- **Senior level executives of wireless communications engineering technology companies.**
- **Provide guidance and direction.**
- **All major industry sectors represented**
  - **Carriers & Service Providers**
  - **Manufacturers**
  - **Security & Public Safety**
  - **Enterprises/Users**
  - **Government (including Regulatory)**
  - **Consultants**
- **Metric: Active promotion of the program**



# Industry Advisory Board

**Rémi Thomas**

- Orange France Telecom

**Asok Chatterjee**

Ericsson

**Byung K. Yi**

- LG Electronics

**Bob Fonow**

- Trivon AG

**Arun Pande**

- Tata Consulting Services

**Ashley Hunter**

- Telstra

**Adam Drobot**

- Telcordia Technologies

**Francis E. O'Brien**

- Alcatel-Lucent

**Gerry Flynn**

- Verizon Wireless

**Hua Huang**

- Huawei

**Fadel Digham**

- Egyptian National Telecom Regulatory Authority

**M. Ahsan Baig**

City of Oakland (CA)  
Public Safety IT

**Ron Jost**

- US DoD NII

**Luis Jorge Romero**

- Telefonica

**Javan Erfanian**

- Bell Mobility, Bell Canada

**Ron Webb**

- Nokia



# "Item" development

- **Question Writing and Review**
  - Individual volunteers create questions with verifiable references pertaining to specific tasks or knowledge statements from the Delineation.
  - Group meetings are held to review each question, correct answer, and distracter answers for relevance and quality.
- **Exam Creation – Group meetings**
  - Each question is rated for difficulty and cognitive level
  - Exam forms are created according to the test specifications from the job analysis
  - Exams are created with assurance that the difficulty of the questions are similar from one form to another and that no questions provide the answer to any other question. Practice exams are created at the same time as the exam forms.
  - Score equating; Each exam form requires a separate base score based on question difficulty and question cognitive level





# Ready for Large Scale Deployment

- Process in place to support activities around the year, including
  - Volunteer Recruiting
  - Question Creation
    - Training workshop
    - Question generation
    - Peer review
    - Question revision
    - Team review
    - Submission to question bank
  - Exam
    - Team creation
    - Passing standard setting
    - Results review



# Webok, Practice exams

- **Book: the Guide to “*The Wireless Engineering Body of Knowledge*”**
  - Nine editors from all segments of the industry
  - Contributions from numerous selected experts
  - Each chapter is a high-level survey of a specific area and provides detailed references on the subject matter covered
  - Now available from the IEEE Communications Society and publisher John Wiley
- **Practice Exams**
  - Available at [www.ieee-wcet.org](http://www.ieee-wcet.org)
  - US\$75.00 for one exam

**Metric: Sales**



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# Reasons for Slower than Planned Start

- **Starting from scratch to develop the product.**
- **Could not engage industry until we had the product.**
- **Developing the market from scratch as well – no direct competition but no awareness either.**
- **Practice exams were ~ 60 days later than should have been; underestimated # of volunteers needed to construct the exam.**
- **Hardcopy WEBOK is 6 months later than should have been, though softcopy has been up at no cost to applicant.**



# What has Changed?

- - much higher interest expressed by IAB members than last year
- - change in target focus to companies rather than just individuals
- - much stronger marketing campaign in place in 2009, with resulting queries starting to come from companies over past weeks
- - shift to less concern about coupling the training
- - training available over next few months directly from ComSoc, from some Chapters already and from a few companies now
- - personal presentations at two RCCC's



# Outreach

- **FREE: *Wireless Communication Newsletter***
  - Sign up by sending an email to [cert@comsoc.org](mailto:cert@comsoc.org)
  - Distributed bimonthly to 5,000 subscribers
  - Brings you news about wireless engineering issues and updates/information on WCET certification
- **Free 68-page handbook**
  - ~ 10,000 distributed in hardcover at Conferences, Tradeshow; and email (pdf) to direct requests.
- **Webinars**
  - Presented prior to exams
  - Presenters are book contributors, engineers and volunteers who were involved in both the exam and the development of the credential
- **Monthly column in IEEE Communications Magazine, robust Web site**
- **Metric: Distribution, participation, “clicks”, collaborative agreements.**





# Initiated Visit by Telecom Delegation from 25 Provinces in China at ComSoc Headquarter



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# • Promotion / Education- Initiatives

- **Chapters** -- developing training courses for their local members.
- **China** – Preliminary discussions regarding a potential arrangement for testing / promotion with "ATA" (well known Chinese testing center, with network covering many cities. ATA is looking for ways to bring US certification to China. Among Chinese customers would be the Telecom Executives we briefed in NYC.
- **Australia** – Discussions with Victoria University to develop training content consistent with the WEBOK, and to teach courses on that basis.
- **Japan** – Co-promotion with the Mobile Computing Promotion Consortium of their Mobile System Technologies Certification Program.
- **Spain** -- University of Navarra and Telefonica to add WCET training/exams to Telefonica employee development programs
- **US** -- Invited by IWCE to provide WCET-specific content / training during their 2010 expo.
- **Twitter** -- <http://twitter.com/wcet>
- **US** -- investigating having WCET added to qualify for appropriate US DoD occupation- specialty codes; Austin TX Telecom Careers Expo (3-5,000 expected); session on WCET by Elena M. Neira, CWP (IEEE Certified Wireless Professional).



# **In Sum: An ongoing program**

**ComSoc will continue beyond the 2009 NI funding based on...**

**IEEE staff and volunteers have invested 3+ years in creating a credible product, following industry best practices.**

**The investment of ComSoc staff and Volunteer time added to the NIC investment has been extraordinary .**

**The time it took to do it right and the global recession have seriously impacted sales projections set 3 years ago.**

**We know of no other IEEE project with a more promising value proposition for engineering practitioner early in their career.**

**The WCET has rapidly growing international visibility in the industry.**

**WCET Beta testing (under contract) includes exam windows for Spring and Fall of 2009, and Spring 2010.**

**Ongoing program is currently part of the ComSoc 2010 budget cycle.**

