IEEE 5G Initiative Overview

Ashutosh Dutta, Co-Chair
Gerhard Fettweis, Co-Chair
Harold Tepper, Senior Program Director, Future Direction Initiative
Adam Greenberg, Director Industry and Technical Activities, ComSoc

08 December 2016
Roadmap Working Group (Work in Progress)

Roadmap Project
(M. Dohler, C-M. Chen)

Standardization Building Blocks
(P. Nikolich)

Millimeter Wave
(T. Lee)

Mobile Edge Cloud
(M. Simik, C. Buyukkoc)

Massive MIMO
(TBD, G. Fettweis)

Applications Services
(R. Annaswamy)

Security
(A. Dutta, M. Dohler)

TBD

TBD

TBD
## Mapping topics to building blocks

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<thead>
<tr>
<th>Topics</th>
<th>Areas</th>
<th>WGs</th>
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<tbody>
<tr>
<td>&quot;What do we need - verticals&quot;</td>
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<td>5G as enabler for Medical IoT – MI5</td>
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<td>Microgrid-based Power Infrastructure for Integrated Energy and Cellular Service Management</td>
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<td>Automotive Sector Perspective</td>
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<td>Heterogeneous V2X networks</td>
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<td>5G roadmap for V2X services</td>
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<td>IoT Wireless Security</td>
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<td>LiFi Attocellular Networking</td>
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<td>Forward Error Correction Schemes</td>
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<td>CMOS and BiCMOS Integrated circuits for 5G and beyond</td>
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<td>MTT-S mm-wave circuits perspective</td>
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<td>AP-S antenna perspective</td>
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<td>D2D technologies</td>
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<td>EMC Contribution – AP-S</td>
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19 December 2014
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<td>5G launch and Enhance EPC to support 5G use cases</td>
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<td>5G OMEC: proposed mission and roadmap</td>
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<td><strong>CORD: Network Edge Platform for Service Delivery</strong></td>
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<td>5G empowering IoT</td>
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<td>Micro operators for vertical specific service delivery in 5G</td>
<td>Matti Latva-aho</td>
<td>2:00PM – 2:05PM</td>
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<tr>
<td>A 5G Roadmap Breakdown Structure</td>
<td>Adam Drobot</td>
<td>2:05PM – 2:10PM</td>
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Initiative Goals/Objectives

- Foster collaboration and connect technical & business communities to IEEE 5G experts and resources
- Establish IEEE as a Thought Leader and essential to the 5G community
- To be recognized as the go-to resource for engineering and technology professionals in industry, academia and government working on 5G
- Develop and promote valued programs, products and services for the 5G community
- Present a single IEEE face/voice to the 5G marketplace
- Be a true global 5G initiative capturing the needs of all global regions
- Create a neutral platform/forum where those interested in 5G can engage and collaborate
- Be the catalyst for IEEE cross-society activities on 5G
IEEE, like many other organizations, believes that 5G ecosystem is rather large and will cover many different areas:

- Not only an evolution of LTE
- New services, new technologies, new frequencies (6 GHz and mm-wave), new industries, new business models
- Multi connectivity across bands & technologies
  - carrier aggregation with integrated MAC across sub- 6GHz & above 6GHz, 802.X and macro cells (legacy)
  - carrier aggregation for mission-critical resilience via multi-connectivity
- “Rethinking” of fundamental areas used in previous ‘Gs’ (cell architectures, antennas, core networks, etc. -- Is it appropriate to continue to use the word “generation”?)
Initiative Importance to Industry

- Emerging applications such as SDN/NFV, IOT, M2M, eHealth are some key drivers for 5G
- Helps to build a neutral environment involving operators, vendors, academics, regulators, and users to identify problems and propose solutions
- 5G is disruptor and creates opportunities for startups and entrepreneurs
- IEEE can drive the ongoing industry efforts with an all inclusive approach
Initiative Importance to IEEE

- Establish and grow a vibrant global 5G Technical Community that binds heavily with the IEEE
- Identify standardization opportunities and standardization gaps related to 5G
- Facilitate the development of 5G technical architectures
- Develop 5G products: Conferences, Publications, Education, Training, etc.
- Leverage IEEE’s value and platform for 5G industry-wide consensus development
- Help create a vibrant 5G ecosystem (e.g., policy) toward 2020 and beyond
- Develop a future roadmap for the anticipated paradigm shifts (evolutionary and revolutionary)
Recent Background

  - Participation by over 30 volunteers and IEEE staff representing 12 Societies/OUs
    - Communications
    - Computer
    - Solid States Circuits
    - Signal Processing
    - Vehicular Technology
    - Technology and Engineering Management
    - Instrumentation & Measurement
    - Intelligent Transportation
    - Microwave Theory and Techniques
    - Standards Association
    - Educational Activities
    - Future Directions

- Identified Working Groups and Projects for 2016/2017
5G Initiative Organization

Major Project: 5G Roadmap

- Steering Committee Co-Chairs
  - A. Dutta, G. Fettweis

- Staff Program Director
  - H. Tepper

Education Track
- Education Working Group
- Publications Track
- Publications Working Group
- Web Portal/Content Dev. Track
- Web Portal/Content Dev Working Group

Publications Track
- Conferences / Events Track
- Conferences / Events Working Group

Web Portal/Content Dev. Track
- Standards Track
- Standards Working Group

Conferences / Events Track
- Branding/Marketing Track
- Branding/Marketing Working Group

Standards Track
- Community Development Track
- Community Development Working Group

Industry Engagement Track
- Industry Engagement Working Group

Major Project: 5G Roadmap
- Project A
- Project N
**Working Group Scope**

- **Education WG** (R. Ting, R. Annaswamy)
  - Define, develop and manage portfolio of offerings/activities including:
    - eLearning Modules
    - Tutorials
    - Webinars
    - Podcasts
    - Google Hangouts

- **Publications WG** (C-L. I, G. Li)
  - Define, develop and manage portfolio of offerings/activities including:
    - eNewsletter
    - Journal, Transactions
    - Magazine
    - Supplements to other publications
    - Special issues in other publications

- **Web Portal/Content Dev. WG** (J. Irvine)
  - Determine, source and manage content placed on portal
  - Ensure that portal is refreshed on a continuous basis

- **Conferences/Events WG** (A. Dutta, L. Ladid)
  - Manage Initiative events
    - Conferences
    - Workshops
  - Determine and manage participation in other events
    - Patron
    - Exhibitor
    - Panelist
    - Keynote
Working Group Scope

- **Standards WG**
  (A. Gelman, P. Nikolich)
  - Manage portfolio of activities including:
    - New projects
    - Roundtable program for industry leaders
    - Engagement with SDOs and other external organizations

- **Branding/Marketing WG**
  Ralph Irmer
  - Rebranding
  - Logo development
  - Marketing
    - Competitive positioning
    - Visibility
    - Messaging
    - Collateral

- **Community Development WG**
  (J. Irvine, A. Wyglinski)
  - Establish and grow a broad IEEE 5G Community including:
    - IEEE Technical Community
    - Collaboratec
    - Twitter
    - LinkedIn
    - Facebook
    - FlipBoard

- **Industry Engagement WG**
  (M. Lu, M. Condry)
  - Drive engagement with industry including:
    - Partnerships
    - Training
    - Career Development
5G Initiative (http://5g.ieee.org)

Summary of Activities

2016 Milestones

- **Initiative Launch**
  - Convened 2 day kick-off workshop in late Aug.
  - Attended by over 30 volunteers/staff representing 12 societies/councils/OUs
  - Steering Committee Meeting Nov 17, 2016

- **Working Group Formation**

- **5G Summits**
  - Conducted 8 summits across the world: US, China, Germany, India, and Denmark

- **Roadmap (Workshop at Globecom)**
  - Launched Technical Working Groups including Standardization Building Blocks, Mobile Edge Cloud, Massive MIMO and Millimeter Wave

- **IEEE 5G Web Portal**
  - Launched new portal on 6 October 2016

- **IEEE 5G Newsletter**
  - Named Editor-in-Chief, Managing Editor and Assistant Managing Editor

2017 Plans

- **5G Summits (www.5gsummit.org)**
  - Continue to conduct summits on a global basis

- **Roadmap**
  - Develop and publish an IEEE 5G Roadmap modeled after the ITRS Roadmap

- **Publications**
  - Launch an IEEE 5G Newsletter with original content focused on a broad audience

- **Web Portal/Content Development**
  - Refresh the portal on a regular basis with original content including written Q&As, interviews, opinion pieces and podcasts

- **Community Development**
  - Establish and build a global, engaged IEEE 5G Community though a broad range of channels including Collabratec, Twitter and LinkedIn

- **Education**
  - Introduce a series of webinars and tutorials

- **Standards**
  - Inventory, update and track 5G related standards activity across industries
Get Involved!

- Seeking volunteers
  - Broad range of opportunities
    - Technical Areas – Massive MIMO, mmWave, Mobile Edge Cloud, Security……
    - Functional Areas – Publications, Education, Roadmap, Content/Community Development…..

- Contact us directly
  - Ashutosh Dutta, Initiative Co-Chair: ad37@caa.columbia.edu
  - Gerhard Fettweis, Initiative Co-Chair: Gerhard.Fettweis@tu-dresden.de
  - Harold Tepper, Initiative Senior Program Director: h.tepper@ieee.org