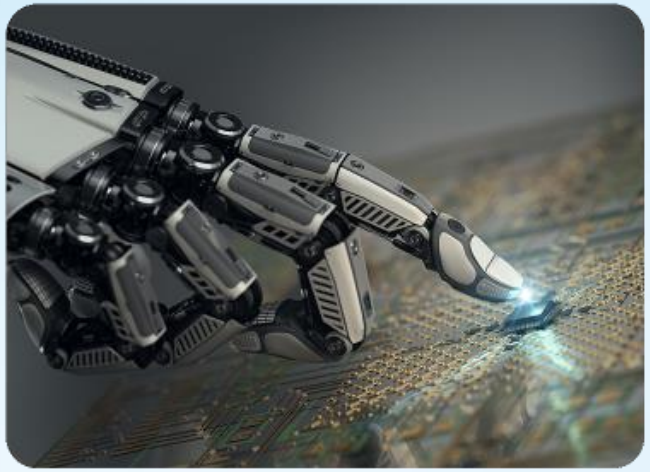
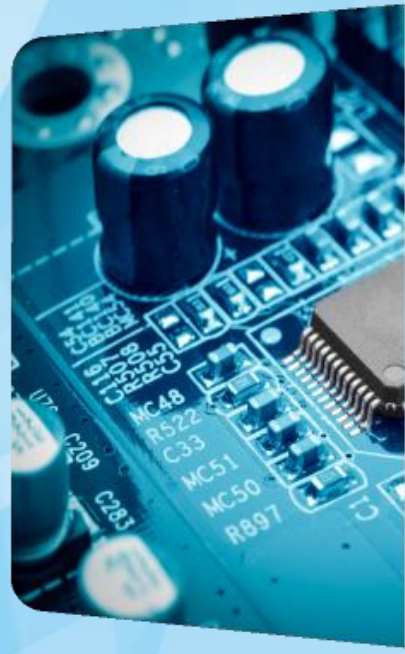




IEEE 5G and Beyond Initiative

Ashutosh Dutta, Gerhard Fettweis, Tim Lee, Rob Fish, Harold Tepper

January 29, 2018

IEEE Future Directions Initiatives

IEEE 5G

IEEE brain

IEEE DigitalSenses

IEEE rebooting COMPUTING

IEEE SOFTWARE DEFINED NETWORKS

IEEE BigData

IEEE GREENICT

IEEE CYBER SECURITY

IEEE Internet of Things

IEEE Smart Cities

SMART MATERIALS

Symbiotic Autonomous Systems

Incubation

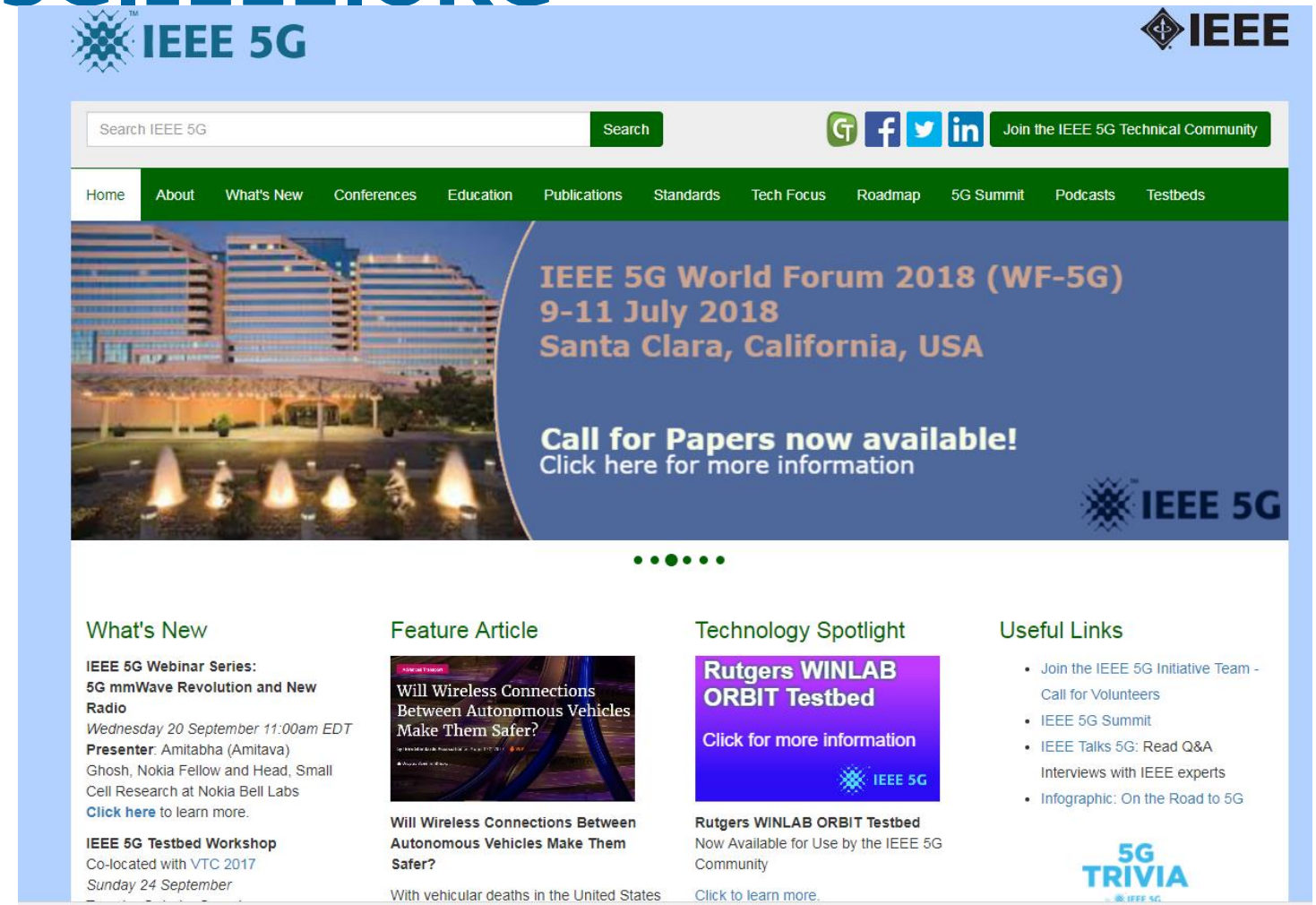
Phase 3

Maturity Level

ieee.org/futuredirections

IEEE

5G.IEEE.ORG



IEEE
Advancing Technology for Humanity

IEEE 5G

IEEE

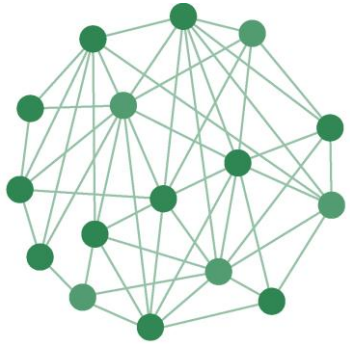
Welcome to the Innovation Revolution

5G is an enabler of exciting use cases that will transform the way humanity lives, works, and engages with its environment.

5G will be

Bandwidth 100s of Mb/s

Latency less than 1ms



>30Gbps throughput and >1 million connected devices

Massive broadband that delivers gigabytes of bandwidth on demand

LEARN MORE AT
5G.IEEE.ORG

Internet of Things

+ **5G** = **Next Wave of Connectedness**

5G will be the backbone enabling the industrial IoT…

...assisting our transportation needs...

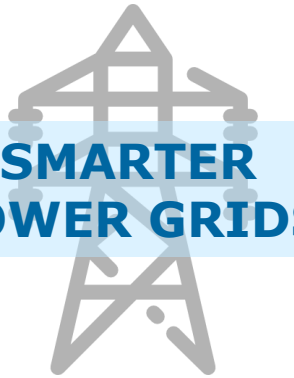
INTER-VEHICLE SENSING

INTER-VEHICULAR COMMUNICATION

DRIVERLESS TRANSPORT

...and completely improving our daily lives.

SMARTER TRAFFIC SIGNALS



SMARTER POWER GRIDS

EVEN SMARTER HOMES

IEEE 5G

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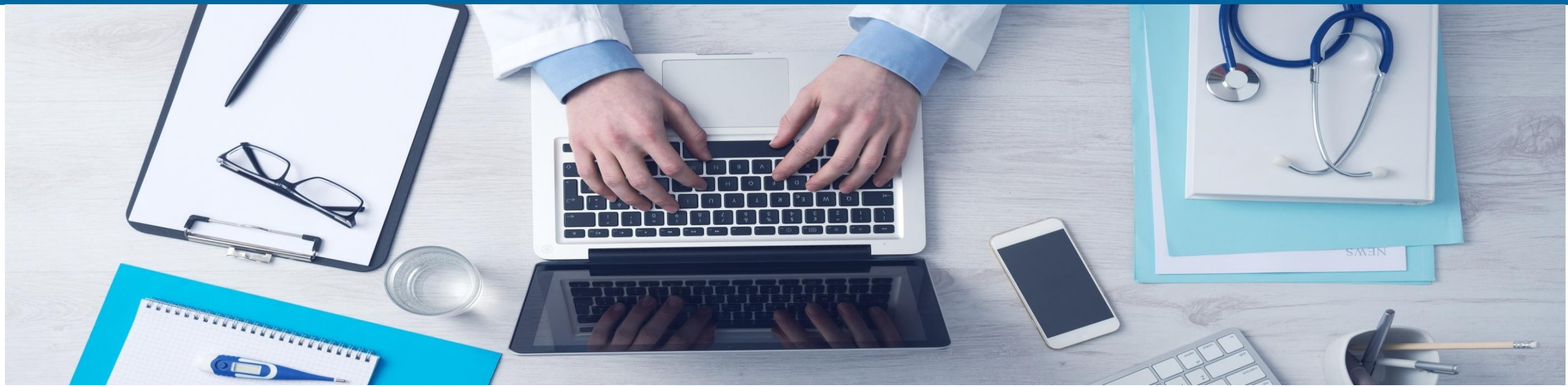


ZERO DISTANCE
from patient to accessible healthcare

CONTAGION CONTAINMENT
Fast awareness and global collaboration

MOBILE ER
Real-time response to trauma anywhere

5G

will impact every industry

...and spark the innovation of unforeseen industries for decades to come

IEEE 5G

IEEE

The global team of experts involved in IEEE 5G are producing programs and activities including…

The 5G Technology Roadmap

short-term (~3 years), mid-term (~5 years), and long-term (~10 years)

research, innovation, and technology trends

Publications

IEEE 5G Transmissions podcast series

IEEE Tech Focus

IEEE Talks 5G Q&A article series

Conferences & Events

1st Annual IEEE 5G World Forum in 2018

5G-related IEEE conferences

5G Summits

Education

IEEE 5G Learning Series

IEEE Live Online Courses

Webinar series

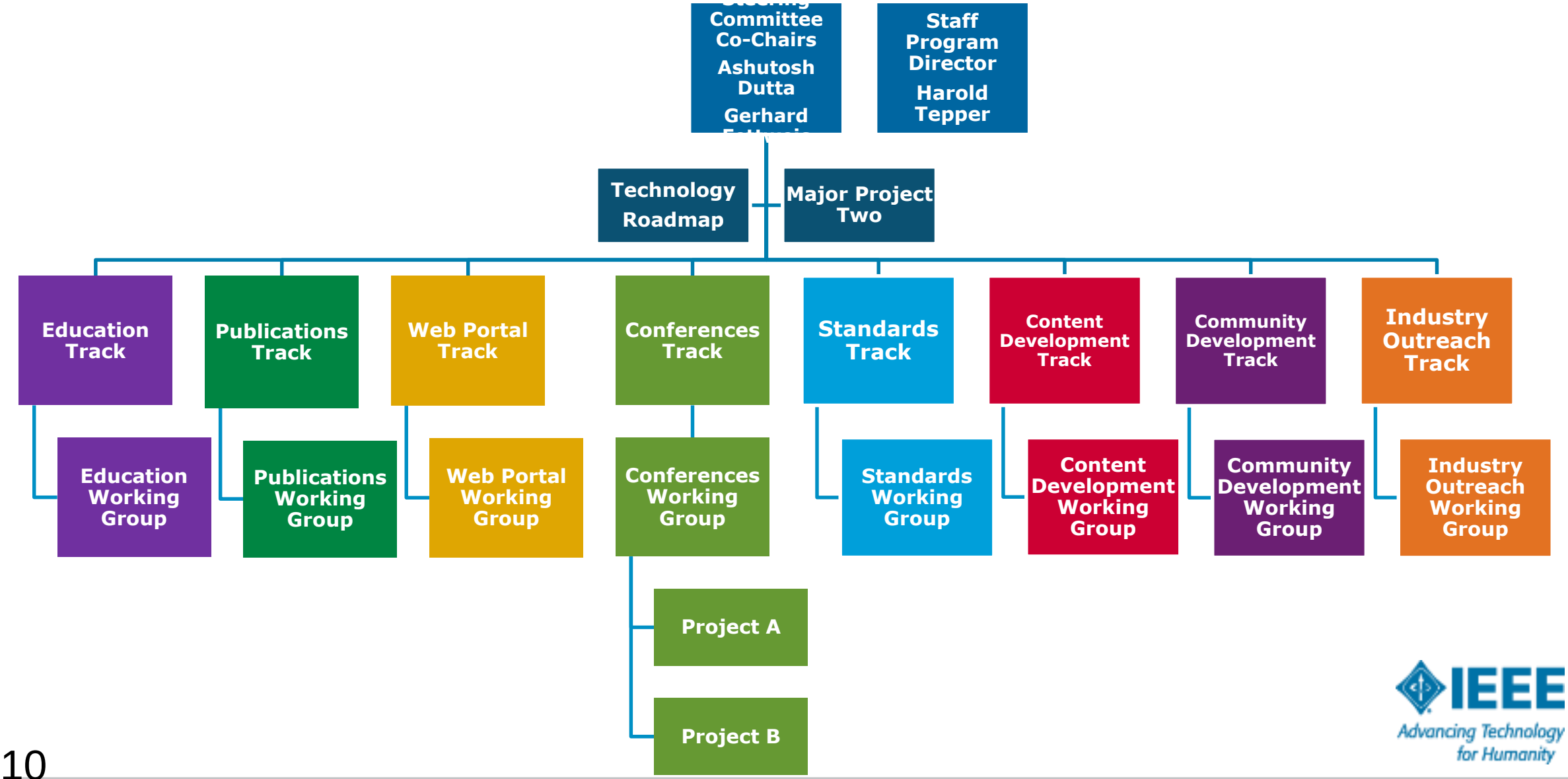
Expert Articles

Published on IEEE 5G web portal and in industry media

Standards

Global, open, and collaborative

5G Initiative Structure



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5G and Beyond Initiative Significant Achievement in 2017

Education

- Executed Three Tutorials
  - Bangalore, India; January 2017, Edison, NJ; April 2017, Shanghai, China; July 2017
- Conducted 4 Webinars
  - 5G - What is it and what new applications are driving it's formation
  - 5G mmWave Revolution and New Radio
  - A look at the companies and organizations working to make 5G a commercial success
  - 5G Technology Is Fantastic, But Can We Afford It?
- "Understanding 5G" eLearning Course in development

Publications

- Published four Issues of IEEE 5G Tech Focus Newsletter; 4 articles/issue
- Special report on 5G in March 2017 Issue of The Institute

Web Portal/Content Development

- Published 5 Q&A articles with IEEE 5G Experts
- Launched IEEE Transmissions Podcast Series – 3 completed to date

Roadmap

- Whitepaper Published; September 2017, More than 1000 views
- Roadmap Workshop conducted at ICC 2017

Community Development

- Web Portal traffic growing steadily at 15%/month – 5K+ visitors/10K+ page views monthly
- Collabratec Community increased to 8K+ members
- Technical Community, Twitter. Facebook growing at 10%/month

Conferences/Events

- Announced Initial IEEE World Forum on 5G conference July 9-11, 2018 in Santa Clara, CA.
  - Call for Papers; December 2017
- Collaborated with ComSoc on 10+ 5G Summits Worldwide YTD
- IEEE 5G and Beyond Testbed Workshop in Toronto

Standards

- Creation of 5G standards database across multiple societies
- First 5G Standards Forum Meeting (October 9)

Industry Engagement

- Conducted 5G Industry panels at WOCC 2017 and ISIE 2017
- Delivered talks and keynotes at multiple conferences, Section Congress

5G Initiative Plans for 2018

Education

- Conduct additional Tutorials around the world
- Continue with Monthly Webinars

Publications

- Publish four Issues of IEEE 5G Tech Focus Newsletter
- Work with societies to publish special issues of society Magazines/Journals on 5G

Roadmap

- Develop Technology Roadmap
- Continue with Roadmap Workshops in ICC and Globecom

Community Development

- Continue to grow all communities and engage members

Conferences/Events

- Conduct 5G World Forum Conference in July
- Support/Collaborate on 5G Summits and other 5G Congress

Marketing/Re-Branding

- Publicize a new brand, logo, and messaging for the 5G Initiative

Standards

- Conduct Standards Forum workshops enabling all societies to propose new 5G standards projects

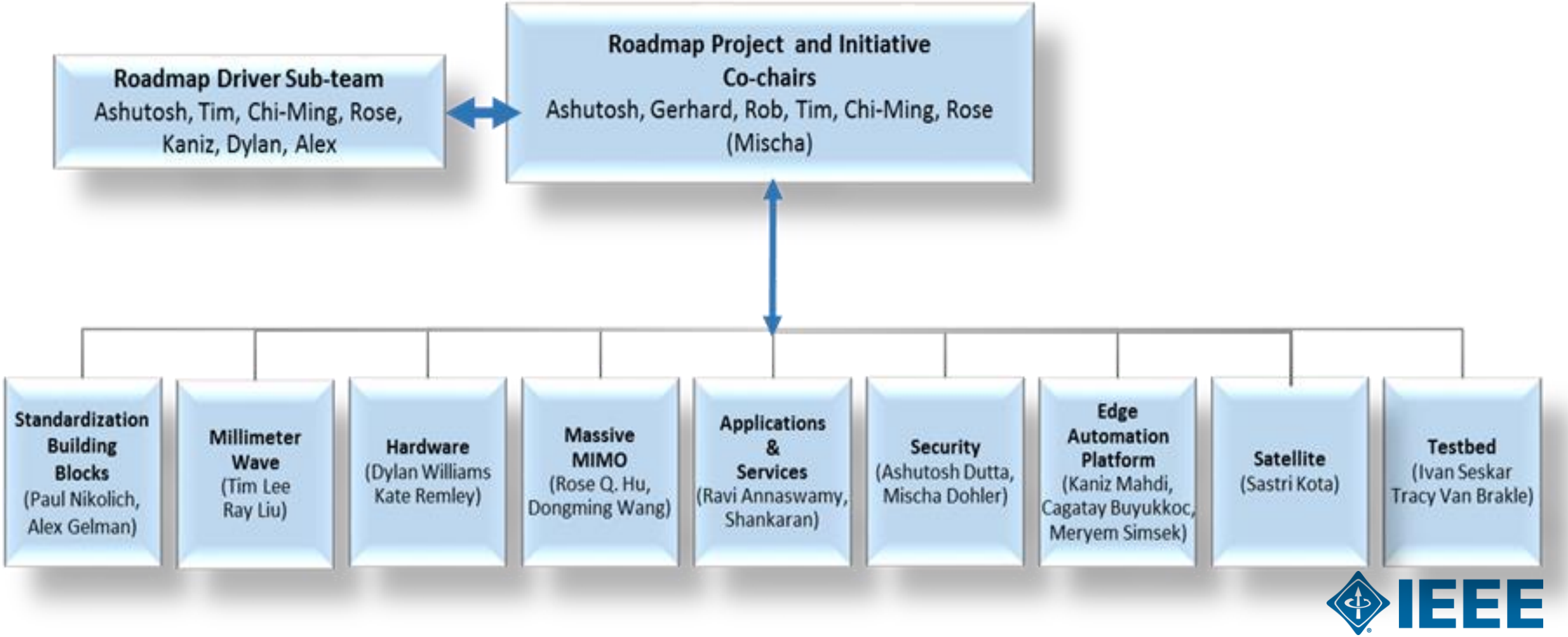
Industry Engagement

- Initiative sponsored panel at ITSC 2017

Testbed

- Rutgers WINLAB as pilot 5G testbed. Expand on it.

5G Roadmap Working Group

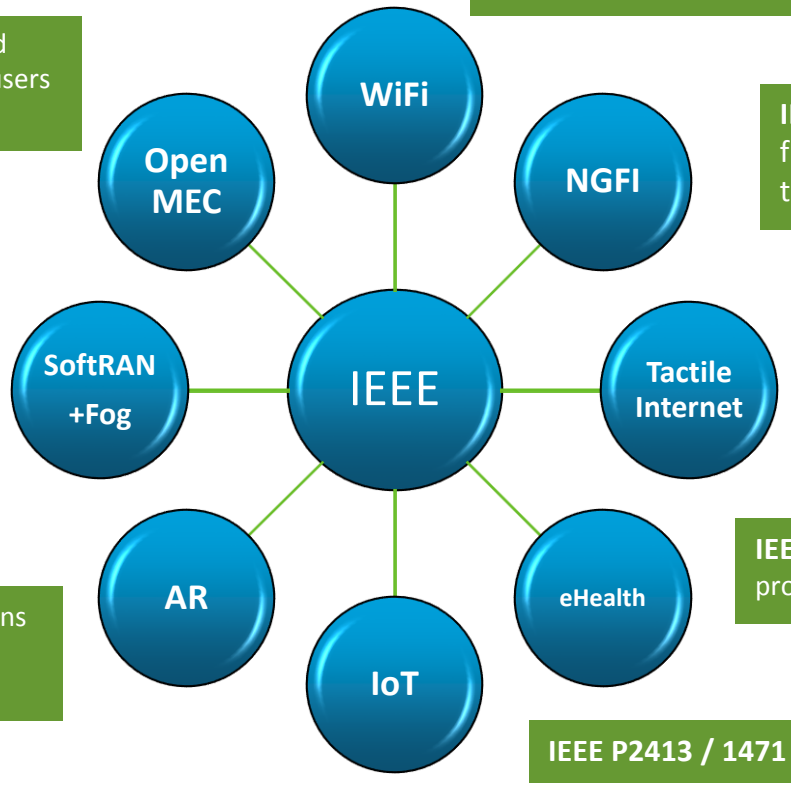


IEEE: Standards and Global Collaboration for 5G

IEEE provides a complete, end-to-end, collaborative framework today for accelerating the realization of 5G and its revolutionary use cases tomorrow.

IEEE 802.11
standard supported by almost any mobile device in the market today

Mobile Edge Cloud brings SDN/NFV frameworks and data path programmability to the proximity of end users as key enablers for service differentiation



IEEE 1914/1904
flexible, efficient and scalable packet-based fronthaul transport networks

SoftRAN is to create a SD RAN flexible enough to control applications with the wireline centric concepts of "fog" in a SD-controller

IEEE 1918
non/mission-critical applications (e.g. manufacturing, transportation, healthcare, mobility, edutainment, events)

IEEE P1589/P1587.6/P1857.9/P3333.2.4 Industry Connections the integration of computer-generated sensory content with the physical world

IEEE 11073
provides a global platform for eHealth stakeholders

IEEE P2413 / 1471 / 42010

GLOBAL

IS

WHAT IS NEEDED

LOCALLY EVERYWHERE

39 Summits
IEEE 5G Summit Series – 2015 - 2018 (www.5gsummit.org)

30 5G Summits, More than 5000 attendees (onsite and online), 400 Speakers, Streaming and Recording Archieved

IEEE 5G Summit Series – 2015 – 2018 (www.ieee-5gsummit.org)

3 IEEE 5G Summits in 2015

8 IEEE 5G Summits in 2016

19 IEEE 5G Summits completed in 2017

9 IEEE 5G Summits planned in 2018

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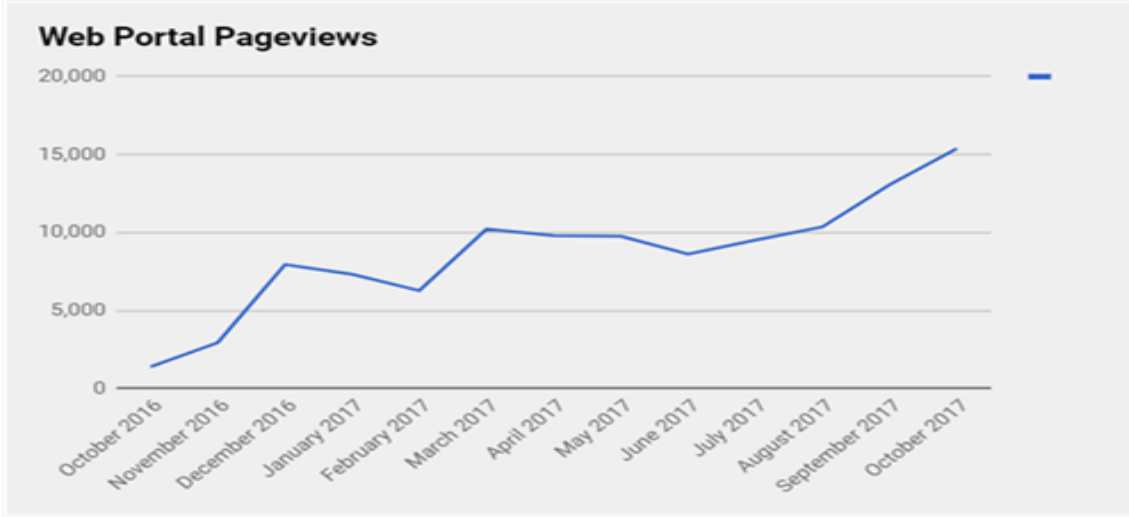
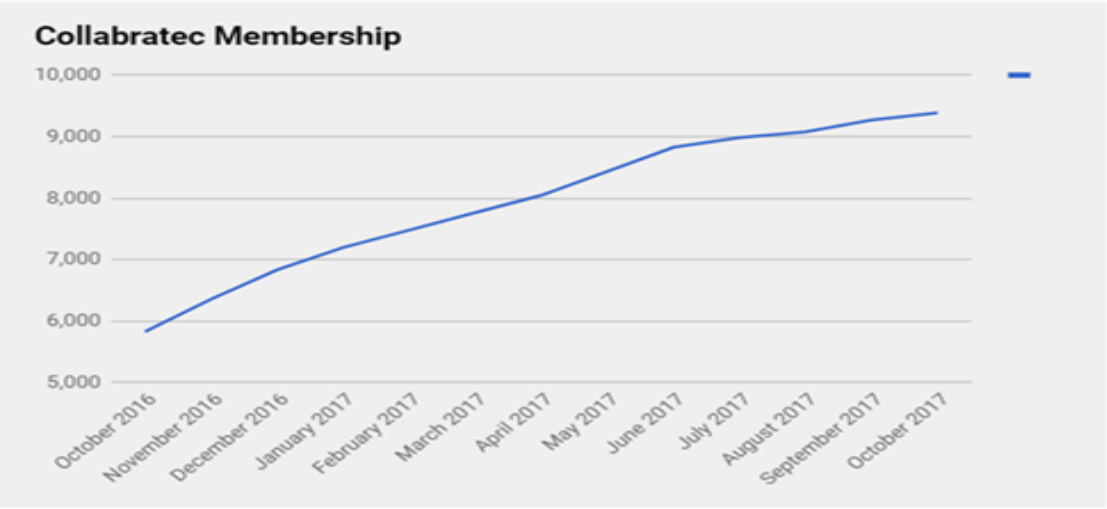
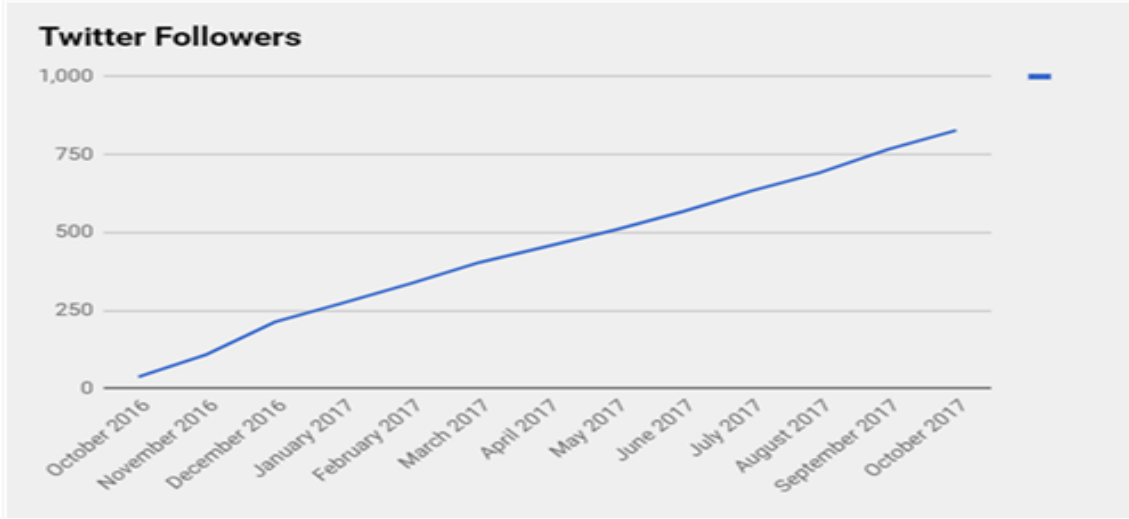
Snapshots of Community Development for IEEE 5G Initiative





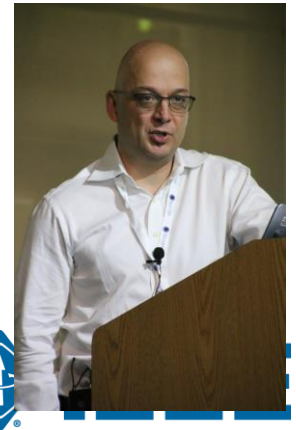


First 5G Summit
Princeton University May 2015

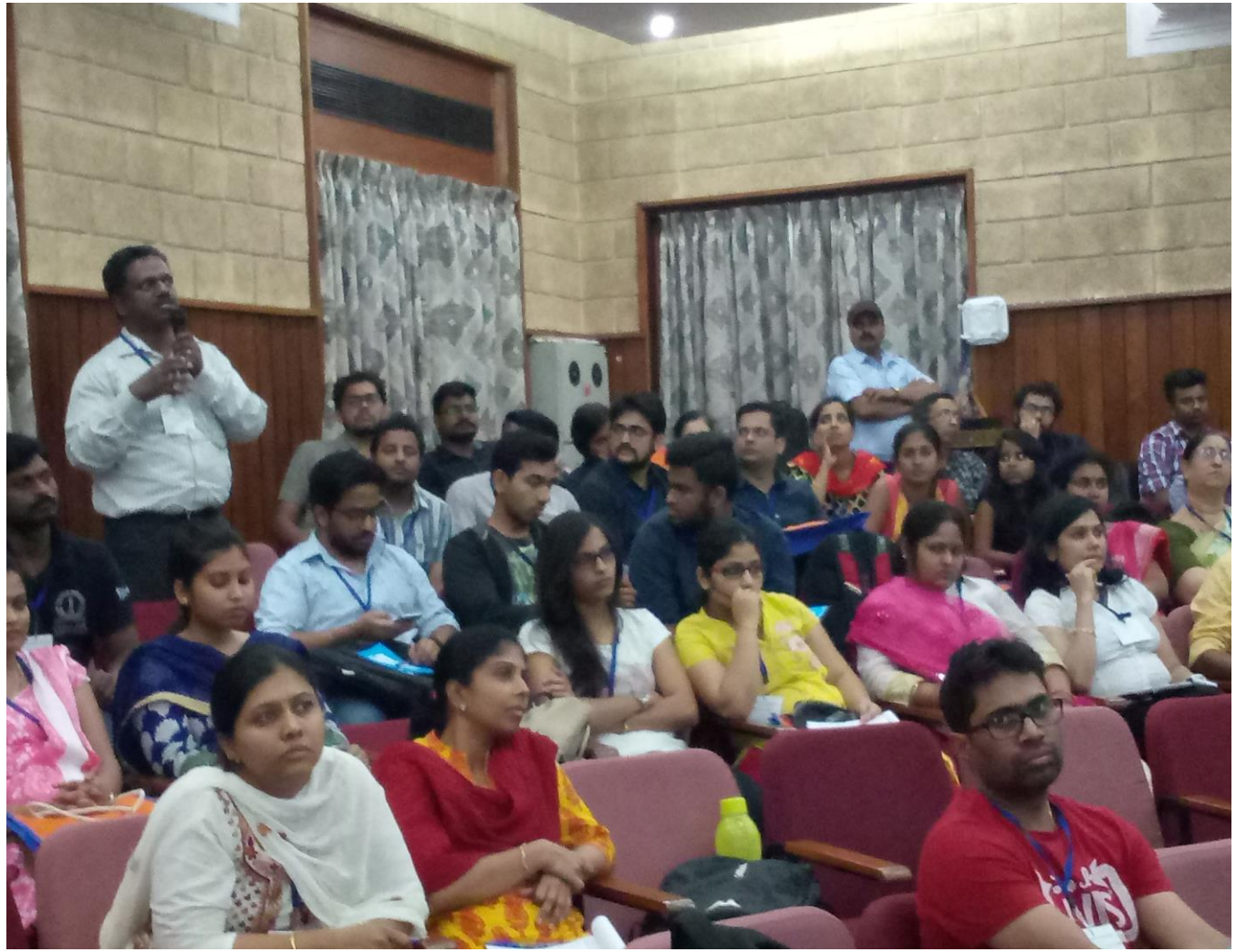
- A successful event

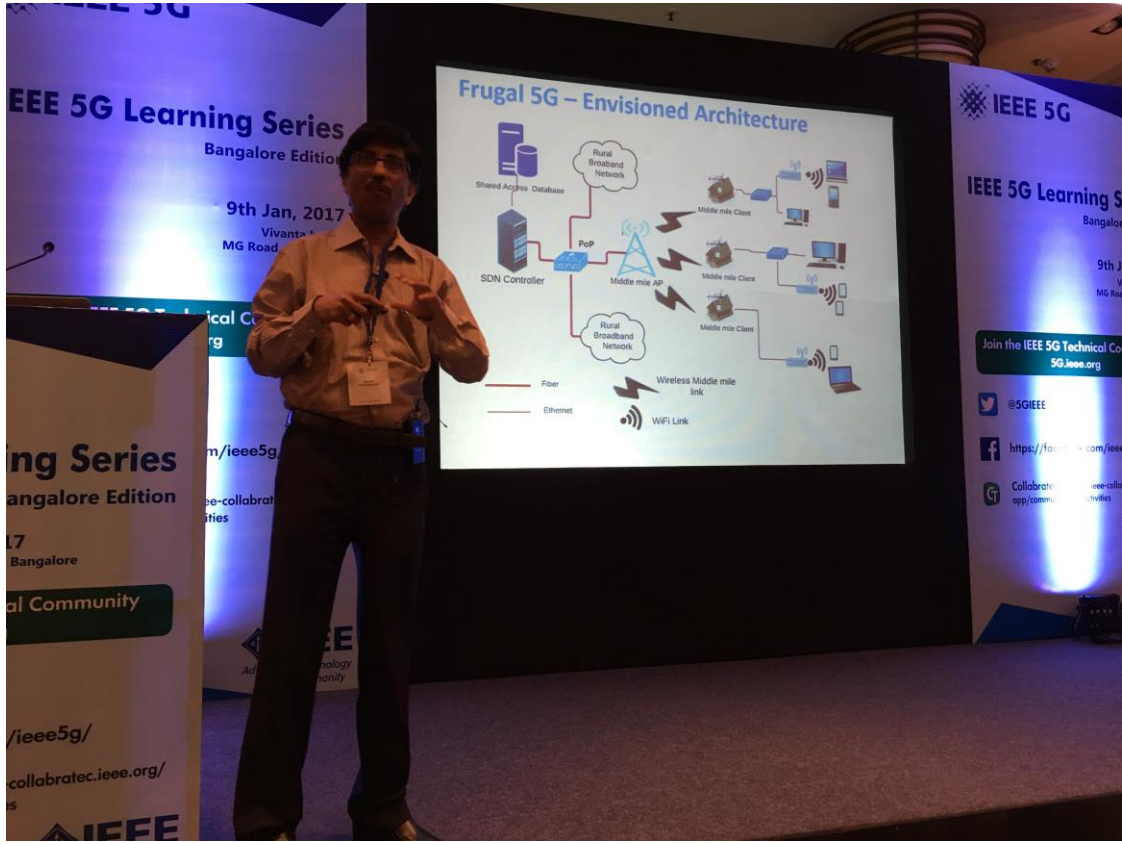
IEEE

SANTA CLARA SUMMIT, 2015



BANGALORE SUMMIT 2017





IEEE 5G

IEEE

Whether you are a platform provider, operator, manufacturer, or service/ content provider, there is a path for you and your business to be seen, heard, and make an impact in 5G

…contribute to the inaugural IEEE 5G World Forum conference. 9-11 July 2018 in Santa Clara, CA…

…contribute to our publication, IEEE 5G Tech Focus…

…lead an IEEE 5G use case or infrastructure project.

IEEE 5G

IEEE

GETTING INVOLVED IS EASY…

Visit 5G.IEEE.ORG to learn more, join, and get involved.

… ADVANCING 5G NEEDS YOU

WE NEED YOU!

IEEE Beyond 5G Technology Roadmap

Innovation | Vision | Industry Dialogue

IEEE IEEE 5G

You're invited to participate in the **IEEE Beyond 5G Technology Roadmap** effort to help stimulate an industry-wide dialogue to outline a technology and innovation vision of the development and deployment of 5G and beyond in the short-term (~3 years), mid-term (~5 years) and long-term (~10 years). Your expertise as an industry subject matter expert is needed in the roadmap dialog regarding the evolution, the challenges faced, and identification of solutions and areas of innovation.

Based on the **IEEE 5G and Beyond Technology Roadmap Whitepaper** (October 2017): *http://bit.ly/5GRoadmapWhitepaper*

Learn more about how to participate at:
https://5g.ieee.org/roadmap/participate

Consider joining one of the IEEE BEYOND 5G TECHNOLOGY ROADMAP TEAMS:

- **Standardization Building Blocks**
- **Millimeter Wave**
- **Hardware**
- **Massive MIMO**
- **Satellite**
- **Edge Automation Platform**
- **Applications and Services**
- **Security**
- **Testbed**

You're also invited to participate at the IEEE Beyond 5G Technology Roadmap Workshop:

- 1½ day workshop
- **23-24 May 2018**, Kansas, USA
- Co-located with IEEE ICC in Kansas
- Complimentary, open to all
- Register: *http://bit.ly/5GRoadmapWorkshop*
- Day 1: Individual team meetings
- Day 2: Presentation of team findings

IEEE IEEE 5G

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THANK YOU

and

JOIN US FOR THE INNOVATION REVOLUTION

LEARN MORE AT
5G.IEEE.ORG