

# IEEE Future Networks Roadmap Towards 6G & Enabling Connecting the Unconnected (CTU)

Sudhir DIXIT, PhD, MBA, Life Fellow IEEE  
IEEE FNTC CTU WG Chair & INGR Board Member

**IEEE ComSoc Distinguished Lecture**

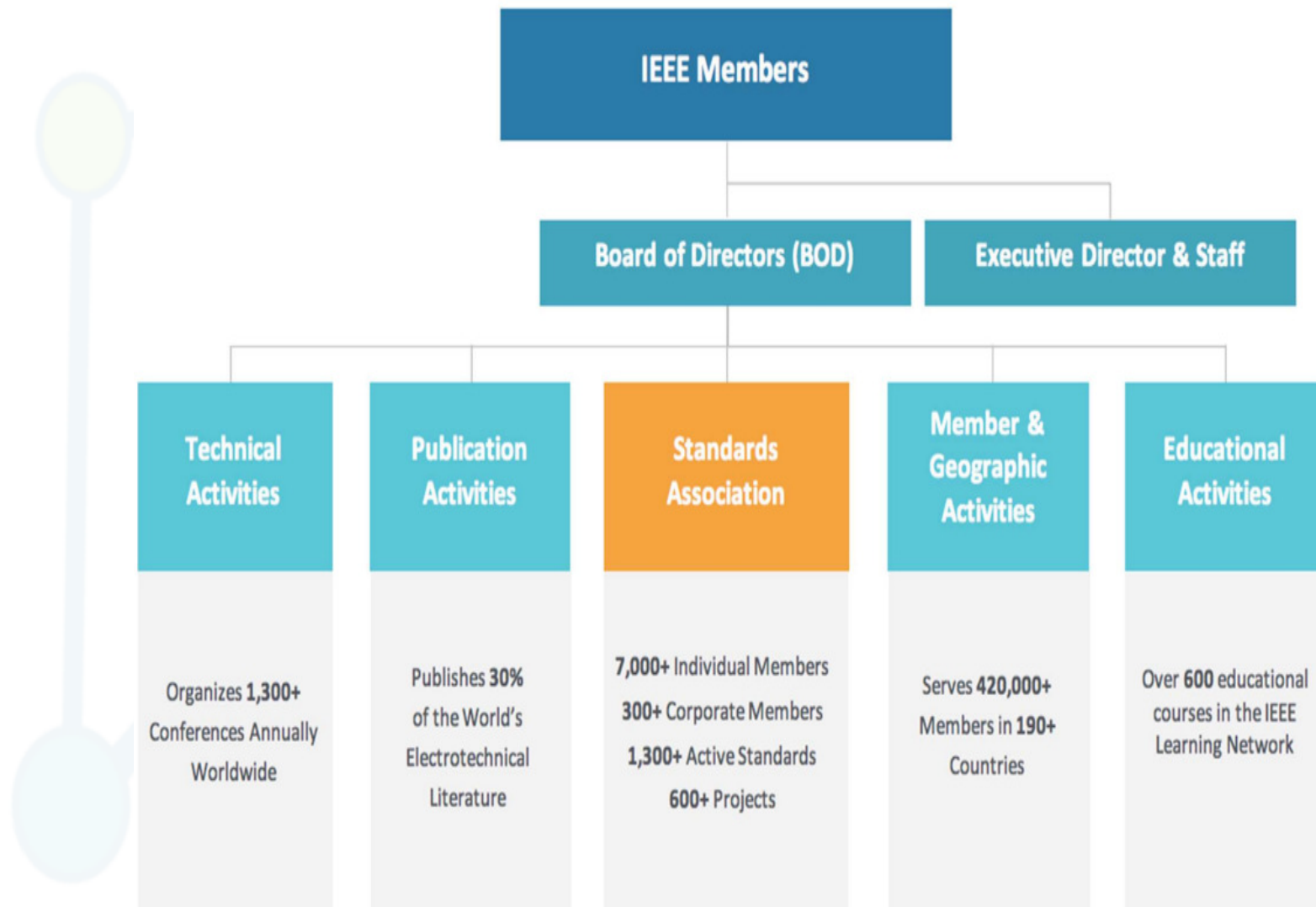
11-13 December 2024



# Agenda

- Introduction to IEEE Future Networks Technical Community
- Introduction to International Network Generations Roadmap (INGR)
- INGR Working Group (WG) details
  - CTU Working Group
- Challenges and opportunities in CTU
- Q&A

# IEEE Governance





# Future Networks Technical Community

(A graduated initiative of Future Directions)

Steering Committee | 2 Subcommittees | 7 Committees | 15 Tech Working Group | +2k active participants

## ORG STRUCTURE

**Current Chair**  
Fawzi Behmann

**Vice Chair**  
Tim Lee

**Past Chair**  
Ashutosh Dutta

**Staff**  
Craig Polk

**9 Sponsor Societies**

**Lead Sponsor**



**Major Sponsors**











**Content**



IEEE Future Networks Tech Focus Issue 16, June 2023

+ webinars, newsletter, podcasts, videos, articles


**3 Major Events**





First Responders & Tactical Networks

**Research & Education**



International Network Generations Roadmap

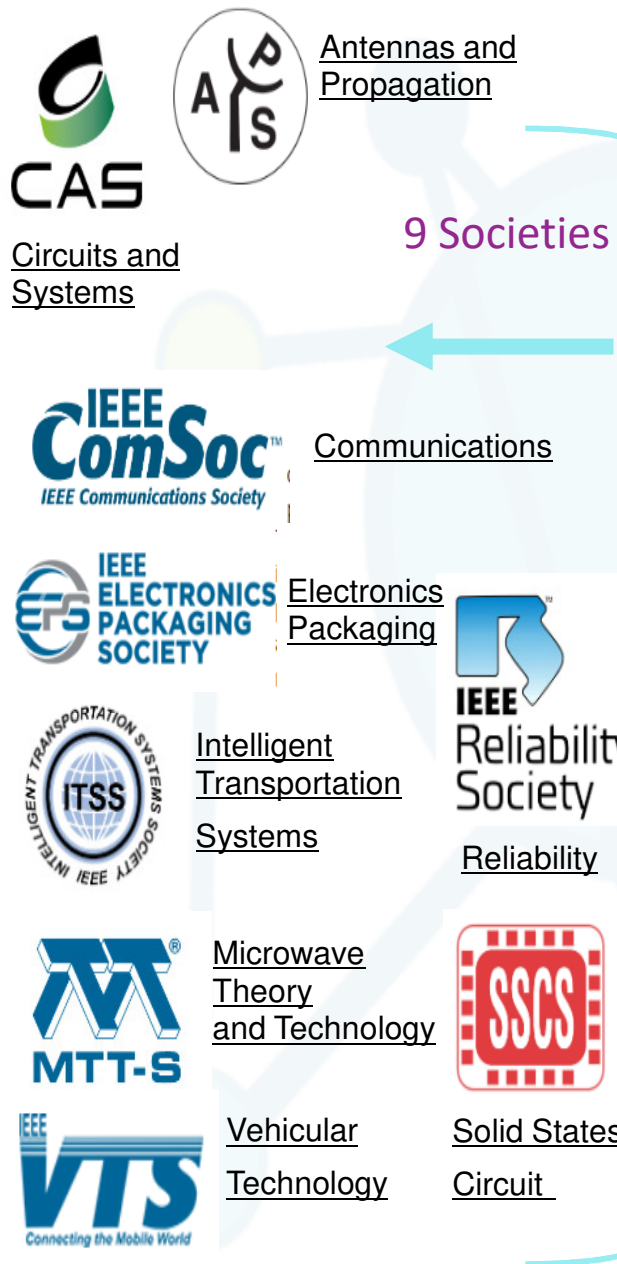
+ eLearning, distinguished lectures, webinar series, white papers, tutorials

## MILESTONES

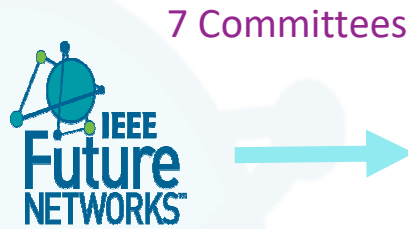
- 2017 Founding
- 2018 1<sup>st</sup> event
- 2019 1<sup>st</sup> roadmap
- 2021 CTU
- 2022 Testbed
- 2023 graduation

## STANDARDS

- 3 programs
- 2 PARs



# FNTC structure



Content & Community Development

Industry Engagement

Conferences and Events

**INGR Roadmap**  
15 Working Groups

Standards

Publications

**Education**  
7 Working Groups



## Collaborate across IEEE Future Networks through INGR Roadmap

Join the team of passionate volunteers who believe that, with widespread participation, some of the technical and engineering risks associated with the migration of 5G & beyond related technologies will result in a much better life for all.

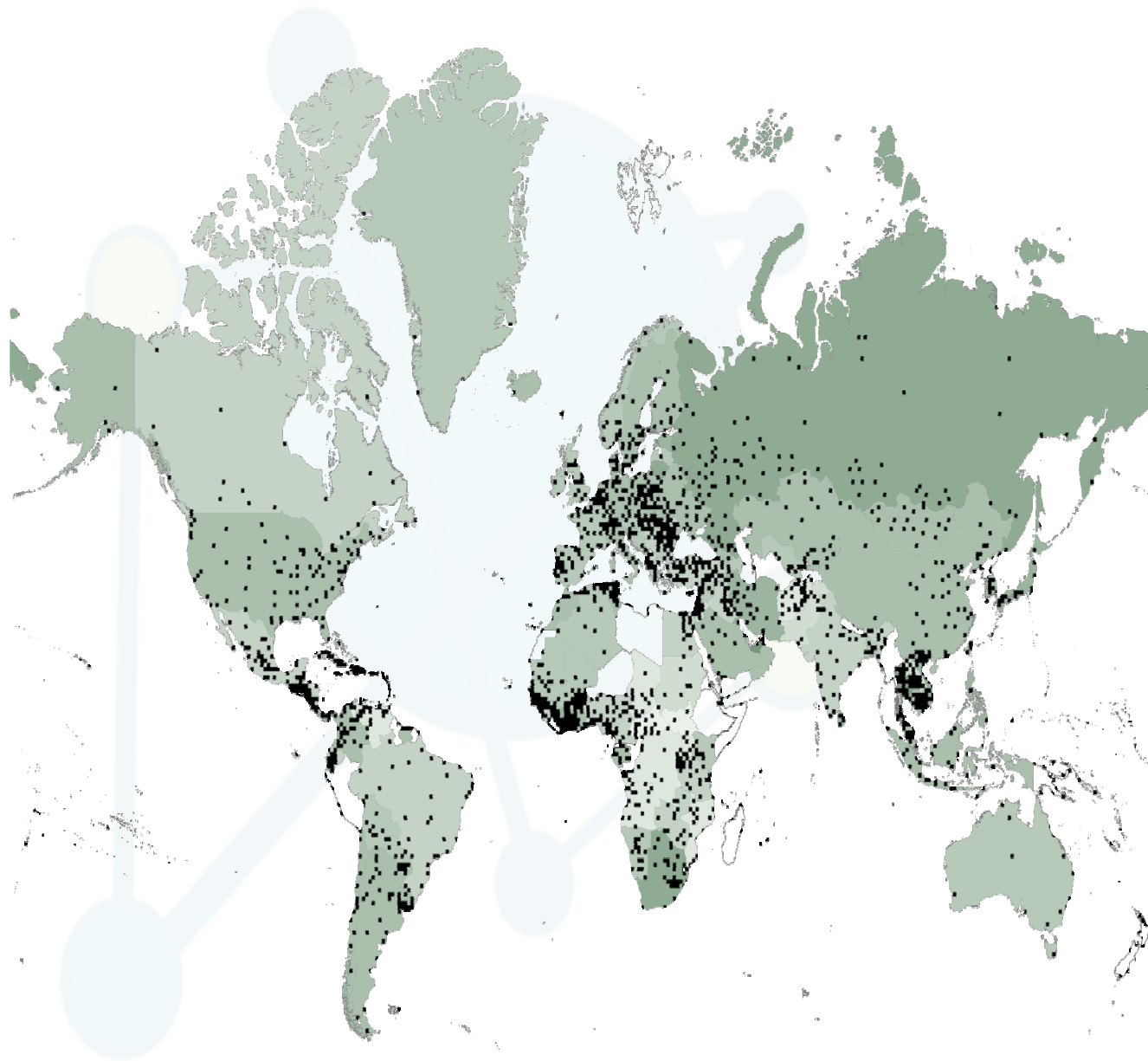
**<https://bit.ly/fntc-interest>**

**IEEE  
INGR**

**International Network  
Generations Roadmap**

Our experts are encouraged to participate, evolve and strengthen the world for the better. Join us!





# IEEE FNTC International Network Generations Roadmap (INGR)

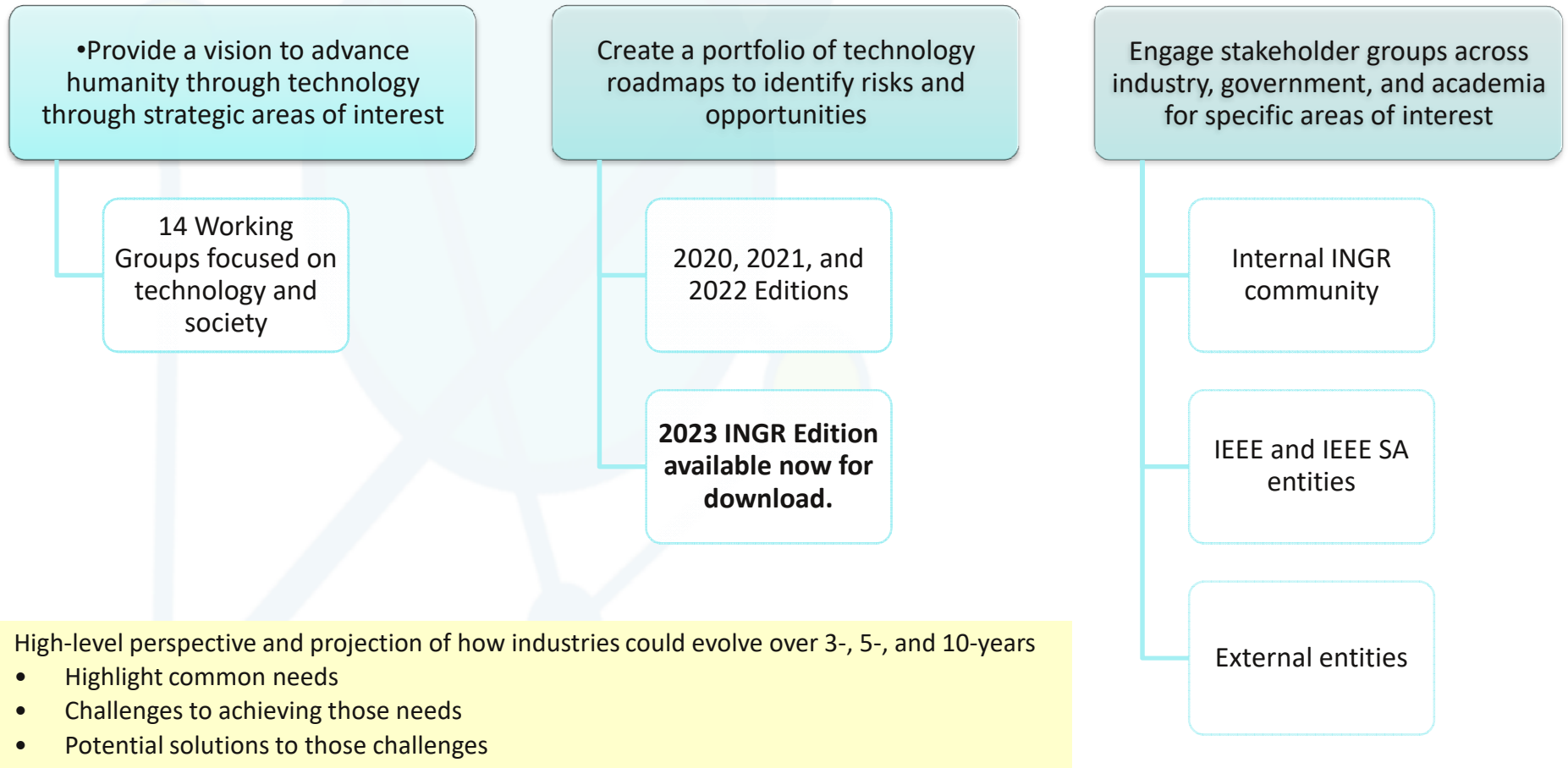
Narendra Mangra, GlobeNet LLC  
IEEE FNTC INGR  
INGR Applications and Services WG  
IEEE SA P1950.1 (Smart Cities Framework)



Enabling 5G and Beyond | [FutureNetworks.ieee.org](https://FutureNetworks.ieee.org)



# INGR Strategic Objectives

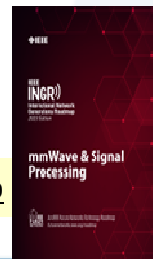
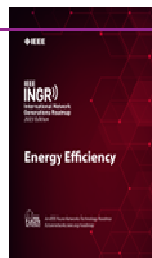




# IEEE INGR Structure and Working Groups

CATEGORY	DESCRIPTION	INGR WORKING GROUP CHAPTERS
User Access	This group describes how the users reach the network	<ul style="list-style-type: none"> <li>Satellites</li> <li>Deployment</li> <li>Connecting the Unconnected (CTU)</li> </ul>
Network Components and Performance	This group describes how the networks are interconnected	<ul style="list-style-type: none"> <li>Edge Automation Platform</li> <li>Massive MIMO</li> <li>System Optimization</li> <li>Optics</li> <li>mmWave</li> </ul>
Systems and Standards	This group describes system standards and testability	<ul style="list-style-type: none"> <li>Standardization Building Blocks</li> <li>Testbed</li> <li>Energy Efficiency</li> </ul>
Services and Enablers	This group represents all the elements that enable deployment, assure functionality and security and address impact on society and environment	<ul style="list-style-type: none"> <li>Security</li> <li>Applications and Services</li> <li>Artificial Intelligence and Machine Learning (AI/ML)</li> </ul>

**14 Chapters  
(2024 Edition)**



<https://futurenetworks.ieee.org/roadmap>



Enabling 5G and Beyond | [FutureNetworks.ieee.org](https://FutureNetworks.ieee.org)



# IEEE FNTC INGR Working Groups

## Working Group Teams

Working Group	Chairs	Email to contact to participate
Co-Chairs	Chi-Ming Chen, Rose Hu, Narendra Mangra	5Groadmapinfo@ieee.org
Applications and Services	Ravi Annaswamy, Narendra Mangra	5GRM-appssvcs@ieee.org
Artificial Intelligence / Machine Learning	Deepak Kataria, Anwar Walid, Baw Chng	5GRM-AIML@ieee.org
Connecting the Unconnected	Sudhir Dixit, Ashutosh Dutta	5GRM-connecting@ieee.org
Deployment	David Witkowski, Tim Page	5GRM-deployment@ieee.org
Edge Services and Automation	Prakash Ramchandran, Sujata Tibrewala, T.K. Lala	5GRM-eap@ieee.org
Energy Efficiency	Brian Zahnstecher, Francesco Carobolante	5GRM-energy@ieee.org
Massive MIMO	Yiming Huo, Nasir Hussain	5GRM-massiveMIMO@ieee.org
Millimeter Wave and Signal Processing	Tim Lee	5GRM-mmWave@ieee.org
Optics	Dan Kilper, Shan Wey	5GRM-optics@ieee.org
Satellite	Sastri Kota, Giovanni Giambene	5GRM-satellite@ieee.org
Security and Privacy	Ashutosh Dutta, Eman Hammad	5GRM-security@ieee.org
Standardization Building Blocks	Alex Gelman, Reinhard Schrage, Mehmet Ulema	5GRM-standards@ieee.org
Systems Optimization	Lyndon Ong, Meryem Simsek	5GRM-sysopt@ieee.org
Testbed	Ivan Seskar, Mohammad Patwary	5GRM-testbed@ieee.org

Join today:

[bit.ly/fni-join](https://bit.ly/fni-join)

Thank You!

ありがとうございます

谢谢!

شكراً لك

धन्यवाद!

Gracias!

Kittos!

Tak!

Merci!

Danke Schön!

Ciao!

**Join IEEE FNTC to drive technology  
for humanity**

**<https://futurenetworks.ieee.org/>**

Contact: [sudhir.dixit@ieee.org](mailto:sudhir.dixit@ieee.org)

