



International Network Generations Roadmap

-2021 Edition-

Applications and Services



An IEEE 5G and Beyond Technology Roadmap
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This edition of the INGR is dedicated to the memory of Earl McCune Jr., who left us tragically and too soon on 27 May 2020. Earl was a microwave/RF guru, brilliant technologist, major industry/IEEE contributor, global visionary, keen skeptic, and all around fantastic human being. He was a major contributor to the INGR's early work on energy efficiency, millimeter-wave, and hardware. He worked for a technologically advanced yet more energy efficient world, and the contents of the INGR are a tribute to that vision. Rest in peace, Earl!



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ABSTRACT

The IEEE Future Networks International Network Generations Roadmap (INGR) Applications and Services Working Group developed a sustainable, structured, flexible, adaptable, and scalable framework that extends across end-to-end ecosystems, and caters to different stages of priorities, resources, and technologies. The framework may be used by academic stakeholders for new research topics of interest, industry stakeholders to develop solutions for roadmap identified opportunities while minimizing negative risks, and government stakeholders for governance and policy development.

The 2021 edition extends the Applications and Services framework from Smart Cities, developed in the 1st edition, towards Smart Regions that include both urban and non-urban areas. This edition of the IEEE INGR Application and Services roadmap chapter includes:

- Applications and Services Framework: a dynamic sustainable framework for applications and services that extends across end-to-end ecosystems, and caters to the priorities, resources, and technologies for local urban and non-urban areas.
- Network of Networks: Future networks components (access, service delivery, operations and service management, and network extensions), use case categories and network operations enhancements.
- Ecosystem of Ecosystems: intra-ecosystem and inter-ecosystem alignments for agriculture, education, electrical power, health care, media and entertainment, public safety, transportation, and water distribution and wastewater treatment ecosystems.
- Function of Functions: strategic and governance related functions to support local area objectives that include economic development, quality of life, stakeholder attraction and retention, and policy development.
- Applications and Services Framework Scenario: smart cities, smart regions, and pandemic planning scenarios

The Applications and Services WG will extend the reach and depth of this framework to add new ecosystems and enhance the existing ecosystems already addressed for future INGR editions.

Key words:

5G, B5G, smart cities, smart areas, pandemic, COVID-19, future networks, roadmap, strategy, ecosystems, framework, governance, eMBB, critical communications, URLLC, mMTC, MIoT, agriculture, education, media and entertainment, public safety, transportation, health care, telehealth, electrical power, water distribution, wastewater treatment

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