The *ITU Journal on Future and Evolving Technologies (ITU J-FET)* is an international journal providing complete coverage of all communications and networking paradigms, free of charge for both readers and authors. The ITU Journal considers yet-to-be-published papers addressing fundamental and applied research. It shares new techniques and concepts, analyses and tutorials, and learnings from experiments and physical and simulated testbeds. It also discusses the implications of the latest research results for policy and regulation, legal frameworks, and the economy and society. This publication builds bridges between disciplines, connects theory with application, and stimulates international dialogue. Its interdisciplinary approach reflects ITU's comprehensive field of interest and explores the convergence of ICT with other disciplines. The ITU Journal welcomes submissions at any time, on any topic within its scope.

Special issue on

Wireless communication systems in beyond 5G era

Call for papers

During the development and deployment of 5G mobile cellular systems, a number of new technological concepts, advances and paradigm shifts have emerged, altering the perspective of the research community on how one should design wireless communication systems in the future.

The proliferation of machine learning and artificial intelligence tools and technologies, while having limited effect on 5G, are already demonstrating their imminent future impact on the design of communication systems across the layers of the traditional communication protocol architecture. Most notably, these technologies further accelerate the trends of cognition and self-organization, ranging from the device spectrum access level, across algorithms governing physical and medium access layer operation, all the way to the level of network organization and resource allocation.

In addition, advent of new materials, combined with their controllability and programmability, transforms the propagation environment from a passive entity into an active communication system ingredient, especially in the domain of high-frequency (e.g., THz-domain) wireless communications based on directed and pencil-beam signal propagation.

In another development, the ever-increasing densification of cellular infrastructure is gradually escaping the Earth surface and we are witnessing introduction of the third, aerial dimension where dense deployments will firstly emerge at a very low-height level using Unmanned Aerial Vehicles (UAVs), such as drones, and Low-Earth Orbit (LEO)-level using micro-satellite constellations, creating novel challenges in 3D network design and optimization.

Next, going to the domain of miniaturization and wireless sensor platforms, progress from on-body to in-body sensors is offering not only further prospects of creating novel human-machine interfaces

that go beyond the existing trends of virtual and augmented reality, but promise future impact on biomedical research, diagnostics, and therapeutics.

The question of energy efficient communication technologies operating at network-wide scales to address raising global energy consumption challenges and climate change concerns and, at the opposite end of the energy consumption spectrum, wireless power transfer technologies for the deployment of self-sustainable and battery-less IoT sensors, are expected to create significant impact on future wireless system design.

Finally, overlaid on the potentials of the technology evolution as described above, lies the key question: What are the future services and applications for which we need to design novel beyond 5G wireless communication systems?

This special issue is dedicated to exploration of future and evolving technologies that are likely to have significant impact on the design of wireless communication systems in the beyond 5G era. The topics of interest for this special issue include, but are not limited to:

Suggested topics

Cognitive and dynamic spectrum access in beyond 5G systems	• New and innovative spectrum sharing concepts for beyond 5G • Softwarization and AI for dynamic and cognitive spectrum access
Machine learning and artificial intelligence (AI) for wireless communications system design beyond 5G	• Deep learning, federated learning, reinforcement learning for wireless communications • AI-driven PHY and MAC layer design for wireless communication systems
Wireless communications with intelligent reflecting surfaces (IRS)	• Metamaterials and metasurfaces • Wireless communication system design with IRS • Machine learning and AI for IRS-enabled wireless communications
THz wireless communications	• Design and analysis of THz communication systems • Advances, opportunities and challenges of THz wireless communications
Internet of Things and edge AI integration	• Future design and development of massive IoT communications • Edge AI for massive IoT • Blockchain and massive IoT in beyond 5G

3D networks of terrestrial, airborne and satellite communication systems	• Design and deployment of UAV-based wireless communication systems • Integration of terrestrial and non-terrestrial wireless networks
Large scale wireless powered networks and backscatter communications	• Future advances in wireless information and power transfer • Backscatter communications
Network softwarization and virtualization in beyond 5G era	• AI-driven autonomous and self-organizing networks • Software defined networking and network slicing beyond 5G • AI-based automated network orchestration and control
Communication systems and networks at nanometer-scales	• Novel human-machine interfaces • Nano-level communications and beyond 5G in medical research • Internet of Nano-Things
Future carbon-neutral wireless communication networks	• Carbon-neutral wireless communications • Energy-efficient wireless networking in beyond 5G era
Applications and services driving beyond 5G communication system development	• System requirements and KPIs for 6G • Future vision for innovative 6G architectures, applications and services • Experimental platforms and testbeds

Additional information

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Beyond 5G, 6G, wireless communication systems, machine learning and artificial intelligence

Extended deadlines
Paper submission: 3 May 2021
Paper acceptance notification: 15 July 2021
Camera-ready paper submission: 30 August 2021

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This special issue calls for original scientific papers. Submitted papers should not be under consideration for publication elsewhere. Submissions must be made electronically using EDAS: Editor's Assistant at https://edas.info/N27972. Templates and guidelines can be found at https://www.itu.int/en/journal/j-fet/Pages/submission-guidelines.aspx

Publication
As soon as they get accepted, papers will be continuously published on the ITU digital library. They will then be bundled into the special issue digital publication.

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