Wireless Communications and Mobile Computing

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Special Issue on
5G Network Architectures for Immersive Applications

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Current developments in telecommunication networks, especially in 5G, have led to much larger bandwidths per user, reduced latency, and increased user accessibility. However, the stringent networking requirements for some applications such as Immersive Environments are still beyond the capabilities of current developments in any wireless networks. Therefore, advanced networking architectures that can support these highly demanding applications are indeed hot research topics. Remote real-time immersive applications, including those comprising multisensorial experiences (video, audio, and haptics), are one of the disruptive classes of applications that today's Internet needs to support. Immersive applications are used in multiple industries, including but not limited to media and entertainment, gaming, healthcare (remote robotic surgery, emergency remote intervention), transport (driver assistance, intelligent navigation), and digital manufacturing. Applications based on virtual and augmented reality can bear high degrees of interactivity, which limit the allowable round trip delays, since large delays between the action and reaction can impair synchronism of data flows and degrade immersive experiences. Similarly, in many cases, the distance between the user's eyes and the head-mounted display is very close, which makes the user experience extremely sensitive to video artifacts, resolution, and frame rate issues. Therefore, much higher bandwidths and robust transmission mechanisms are required.

5G framework offers a fully converged network, where different access types can be selected intelligently; architectures and technologies can be managed dynamically (e.g., network slicing, NFV, software-defined networking, and edge computing) to deliver specific application requirements in an end-to-end fashion. In the specific case of immersive and interactive applications, mobility, service ubiquity, scalability, latency, and bandwidth all have utmost importance. Development of highly demanding applications through investigating how these applications and the 5G network should be coupled to interwork seamlessly is amongst the major challenges of the communications, networks, and multimedia research communities.

This special issue is dedicated to the recent advances in 5G networking architectures designed to satisfy the significant requirements of immersive and interactive applications. Original and unpublished, experimental and/or theoretical research studies that have a significant impact on one or more relevant industry segments are expected from the prospective authors.

Potential topics include but are not limited to the following:

- 5G architectures for remote collaborative immersive systems

- End-to-end autonomous network slicing

- Broadcast/multicast of very-high-resolution content at scale: UHD-HDR, light-field, multiview, 360° video, spatial audio, and virtual environments

- Novel edge/fog computing paradigms in application to high-quality mobile augmented and virtual reality applications (e.g., dense 3D graphics processing, very low latency tracking, and remote collaboration)

- 5G vehicular network architectures enabling immersive visualisation and user interfaces for in-vehicle experiences (communication, entertainment, and navigation)

- Live and time critical applications

- Security and privacy solutions developed for 5G-based immersive systems

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