IEEE Transactions on Vehicular Technology

Call for papers for special section on

THz Communication for Vehicular Networks

The fifth generation (5G) wireless communication should support 1000 times the system throughput, 10 times the spectral efficiency, higher data rates (i.e., the peak data rate of 1 Terabit-per-second (Tbps) and the user experienced rate of 10Gb/s), 25 times the average cell throughput, 5 times reduction in E2E latency and 100 times connectivity density. Among them, thousand-fold increase in capacity becomes the most important requirement for 5G.

In 5G networks, vehicles will be integrated parts of the system, not just end-nodes. In essence, vehicles can act as mobile base stations, which will be beneficial when meeting future challenges, especially with respect to filling coverage holes, supporting local capacity needs that appear unpredictably in time and space, and providing good quality of experience for passengers. Imagine the situation where a high number of vehicles are located in physical proximity (in space domain, relative to radio coverage ranges) generating huge amounts of real time traffic with independent data patterns, which is evident for the need of 100 times more resources in 2020, as more and more vehicles connect wirelessly every day. These resources could of course come from additional spectrum, although this is scarce below 5GHz and less feasible after the second digital dividend, but obviously still available in higher frequency bands for short range broadband connections.

The use of higher frequency bands in the electromagnetic (EM) spectrum, such as millimeter waves (mm-Wave, from 30GHz to 300GHz) is currently gaining momentum. While this is certainly the way to go, the rather limited available consecutive bandwidth (up to 7GHz at most), poses a constraint on the maximum achievable individual and aggregate data-rates. For example, according to the Edholm's law of bandwidth, wireless Terabit-per-second (Tbps) links will become a reality by year 2020. With 7 GHz of bandwidth, this would require the use of a modulation and coding strategy with a spectral efficiency above 100 bits/s/Hz. This is not realistic at all and has not been achieved at lower frequency bands, where the technology is much more mature.

With these results in mind, and motivated by the advanced applications of vehicular networks in what could be referred to as "beyond 5G" (5G+) networks, Terahertz (THz) band communications are quickly gaining momentum. THz-band communications are envisioned as a key wireless technology to satisfy real time traffic demand for vehicular communication, by alleviating the spectrum scarcity and capacity limitations of current wireless systems. The THz band is the spectral band that spans the frequencies between 0.1THz and 10THz. While the frequency regions immediately below and above this band (the microwaves and the far infrared, respectively) have been extensively investigated, this is still one of the least explored frequency bands.

Therefore, this special issue, inspired by the recent advances in THz bands towards 5G+ research initiative, envisions contributions including different aspects ranging from the physical layer signal processing techniques, and the medium access control (MAC) design, to the networking protocols. This special issue will bring together academic and industrial researchers to identify and discuss technical challenges and recent results related to THz for Vehicular communications. Specific topics include, but are not limited to:

- Transceivers for THz vehicular networks
- Antenna and massive antenna arrays for THz vehicular networks
- Information theoretic analysis of THz vehicular networks
- 3D channel models for THz vehicular communication
- Channel estimation techniques for THz vehicular communication

- Energy-efficient modulation and waveform design for THz vehicular communication
- MAC layer design for THz vehicular network
- Interference management for THz vehicular network
- Beamforming, precoding and space-time coding schemes for THz vehicular communication
- Backhaul transmissions for THz band communication
- System-level modeling in THz Massive MIMO networks
- Architecture experimental demonstrations, tests and performance characterization of THz vehicular systems
- Health and safety issues in THz band
- Standardization and business models for THz vehicular network

Manuscript Preparation and Submission:

Authors should follow the guidelines in "Information for Authors" in the IEEE Transactions on Vehicular Technology (http://winet.ece.ufl.edu/tvt/) under Information for Authors. Prospective authors should submit a PDF version of their complete manuscript via the journal online paper submission system at http://mc.manuscriptcentral.com/tvt-ieee

Note: Paper outside the scope of THz communication will not be accepted for submission.

Guest Editors

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Important Dates:

- Paper Submission: ~~March 1, 2016~~ Extended to April 10, 2016
- First Round Decisions: ~~May 1, 2016~~ June 1, 2016
- Revised Papers: ~~June 1, 2016~~ July 1, 2016
- Final Editorial Decision: ~~July 1, 2016~~ August 1, 2016
- Final Manuscripts Due: ~~August 1, 2016~~ September 1, 2016
- Publication Date: ~~Second Quarter 2016~~ First Quarter, 2017