

# IEEE JOURNAL ON EMERGING AND SELECTED TOPICS IN CIRCUITS AND SYSTEMS

## CALL for PAPERS

### Advanced Baseband Processing Circuits and Systems for 5G Communications

#### Guest editors

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#### Scope and purpose

The coming 5G mobile communication is aiming for the connection of tens of billions of wireless devices with some reaching several gigabit-per-second data rates and millisecond-level latency. To achieve this aggressive target, innovation in the wireless communication technology is essential. On one hand, emerging approaches such as cm/mmWave frequencies, cognitive radio, device centric network architecture, cooperative network with joint processing, core network virtualization and reconsideration of the data, control and management planes could help to address these requirements. On the other hand, baseband processing related to advanced coding/modulation, massive MIMO, novel air-interface, and software define radio is also of assumes equal significance.

Being the enabling technology for the coming 5G networking, novel baseband processing is able to focus energy into finer-grained area and provide significant increase in both transmit-energy efficiency and spectrum efficiency. Therefore, it has attracted a lot of research activities in both academia and industry and substantial theoretical progress has been achieved. The corresponding standardization activities have also been initiated, e.g., 3GPP is now studying the feasibility of applying the concept of massive MIMO into LTE evolution.

However, the related research activities from the circuits-and-systems design perspective are still in its infancy. Apparently, only with carefully optimized and efficient hardware implementation, can those baseband algorithms completely fulfill their potential. Otherwise, the overwhelming hardware complexity resulting from the involved massiveness will hinder baseband algorithms' application. To practically implement and deploy this promising class of systems and facilitate the corresponding standardization, many critical issues have to be addressed from a circuits-and-systems point of view.

For instance, one critical challenge for massive MIMO systems is the low-complexity signal detection implementation. Though linear signal detection algorithms such as MMSE detection can provide near-optimal performance, their conventional implementations also entail prohibitive computational complexity of  $O(K^3)$  due to the exact matrix-inversion involved. Similar challenges happen to other emerging baseband processing algorithms. Therefore, the corresponding circuits and systems techniques should also be evolved to bring 5G from theory to practice.

With a focus on bridging the gaps between theory and practical implementations, the goal of this special issue is to demonstrate the latest research progress on circuits and systems design for efficiently realizing baseband processing of 5G wireless. The special issue will bring together academic and industrial researchers to identify technical challenges and recent results related to this area. Original and unpublished research results with topics in any of the following areas or beyond are hereby solicited.

#### Topics of interest

- Advanced channel coding algorithms and implementations for 5G
- Massive MIMO, particularly signal processing and hardware challenges
- Hardware implementations related to non-orthogonal multiple-access schemes
- Circuits and systems for 5G modulation: non-orthogonal modulation and demodulation, FMBC modulation and others
- MIMO signal processing algorithm and hardware designs for mmWave systems
- Software-defined and cognitive radio related signal processing implementations
- Cost-efficient algorithms and implementations for estimation, detection, synchronization, and equalization
- Parallel DSP or multi-core or configurable architectures and algorithms for high-data rate transmission
- Advanced architectures for low-latency wireless communications
- Hardware-software co-design for baseband communications
- System integrations and demos for 5G wireless

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## Submission procedure

Prospective authors are invited to submit their papers following the instructions provided on the JETCAS web-site: <https://mc.manuscriptcentral.com/jetcas>. The submitted manuscripts should not have been previously published nor should they be currently under consideration for publication elsewhere. Note that the relationship to screen content video technologies should be explained clearly in the submission.

## Important dates

1	Manuscript submissions due	<del>2017-02-01</del> 2017-02-15
2	First round of reviews completed	2017-04-18
3	Revised manuscripts due	2017-06-06
4	Second round of reviews completed	2017-07-08
5	Final manuscripts due	2017-07-22

## Request for information

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