Energy efficiency vs circuit power consumption in massive mimo systems

Massive multiple-input multiple-output or massive MIMO system has great potential for 5th generation (5G) wireless communication systems as it is capable of providing game-changing ...

in multi-cell massive MIMO systems is studied in [2]. A new power allocation algorithm is proposed to increase the energy efficiency and capacity of massive MIMO systems [3]. A two-step iterative algorithm with a combination of antennas and users is proposed to maximize energy efficiency in [4].

with relation to the SE and EE during a single-cell massive MIMO system. With considering the circuit power consumption, it is shown that massive MIMO setup is that the EE-optimal design. These works concentrate on the only cell situation. The EE of multi cell network with massive MIMO has also been investigated, that is analysis direction for ...

Energy efficiency is a key requirement for future network design, and user-centric (UC) cell-free (CF) massive multi-input multi-output (MIMO) networks can achieve over ten times the energy efficiency. Based on this, this paper studies a CF MIMO simultaneous wireless information and power transmission system and proposes a UC access point (AP) selection ...

In cell-free massive multiple-input multiple-output (MIMO) systems, it is beneficial to apply low-precision analog-to-digital converters (ADCs) to reduce power consumption, hardware cost, and the load on backhaul link. However, low-precision ADCs will result in serious degradation in spectral efficiency (SE). It is important to achieve a good tradeoff between SE ...

In this paper, we investigate the coexistence of two technologies that have been put forward for the fifth generation (5G) of cellular networks, namely, network-assisted device-to-device (D2D) communications and massive MIMO (multiple-input multiple-output). Potential benefits of both technologies are known individually, but the tradeoffs resulting from their ...

We compare its energy efficiency and spectral efficiency with single cell Massive MIMO systems and demonstrate that in suburban and rural scenarios, cell-free systems can more than double the radiated energy efficiency and at the same time dramatically increase the 95% likely per user throughput, while in an urban scenario, the gain in radiated ...

Massive multiple-input multiple-output (MIMO) systems combined with beamforming antenna array technologies are expected to play a key role in next-generation wireless communication systems (5G), which will be deployed in 2020 and beyond. The main objective of this review paper is to discuss the state-of-the-art research on the most favourable ...

As one of the key technologies of 5G, massive multiple-input multiple-output (MIMO) technology [1,2,3] can

greatly improve the spectral efficiency (SE) of the system by installing a large number of antennas on the base station (BS), this is because the data rates of the system will grow with the increased number of antennas communication systems, ...

They found that cell-free massive MIMO provides around 1.7 times more rate to the users with almost the same energy per bit in comparison to the traditional system. The end ...

The fifth generation (5G) wireless communication system is considered a promising and recent research. Massive Multiple-Input Multiple-Output (MIMO) system has an influential role in improving game-changing enhancements in area throughput and energy efficiency (EE). EE refers to one of the easiest and most cost-effective ways to combat climate ...

The energy consumption of a cell-free massive MIMO-OFDM system consists of two components: (1) the amplifier and basic circuit power consumption of M APs; (2) the power consumption of the backhaul link connecting CPU and APs [13,32,33,34].

The purpose of the current article, Our analysis of Massive MIMO"s energy efficiency (EE) incorporates a realistic model of circuit power consumption (CP), we will discuss the ...

Massive MIMO (MaMi) is expected to become a key technology for 5G systems, providing a large capacity increase at reduced total radiated power. However, besides the radiated power, the power consumption of digital and analog circuits supporting individual antenna chains also has to be sufficiently low, given the large number of antennas. In this paper, we ...

Definition 2. Total bits successfully transmitted by consuming a Joule of energy is called EE measured as bits-per-Joule [] massive MIMO systems, EE is dependent on many factors, i.e., spectral efficiency, network architecture, power consumption by the entire system, and transmission protocol [4 - 9].Existing literature provides mathematical modeling of mentioned ...

E t consists of E DL, E circuit, E cache and E CSI.These four parts are mainly determined by the transmit time of all clusters and front-hauling costs. Since no cache is deployed, the Et of CF systems have less E cache than that of CCF systems. The value of E cache is very small and keeps unchanged in each setup, so the two curves of E t s in CF and ...

Since each antenna in MIMO systems usually requires a separate radio-frequency (RF) chain that consists of RF amplifiers and analog-to-digital converters, which are very pricey and huge power consumption elements in massive MIMO systems. The power consumption of RF chain becomes huge with the number of antennas growing large in a mmWave ...

Massive MIMO will improve the performance of future 5G systems in terms of data rate and spectral

efficiency, while accommodating a large number of users. Furthermore, it allows for 3D beamforming in order to provide more degrees of freedom and increase the number of high-throughput users. Massive MIMO is expected to provide more advantages compared to ...

considerably, we observe a drastic reduction in the circuit power consumed by the system. MM delivers multiple orders of EE gains because it offers large multiplexing and array gains at reduced power consumption levels. C. How Practical is Massive MIMO? Favorable propagation is derived in [2] as an asymp-

the total power consumption is the sum of the transmission power and hardware circuit power consump,h can be defined as where c is the fixed value for the circuit power consumption and t is the transmit power allocation for .The energy consumed by RF c,including the power amplifier and the power allocation for t.cuit power consumption is Q c ...

In [15], an antenna selection scheme was proposed to maximize the energy efficiency for a Massive MIMO downlink system. The authors of [16] analyzed the effect of the extra circuit power consumption on the energy efficiency for multi-cell Massive MIMO systems and showed the curve of energy efficiency when the number of transmit antennas increases.

The vast energy consumption of wireless communication systems has been becoming a daunting task, with an increase in users, to be dealt with precisely. Hence, this paper is an attempt put forth to present a decent study on the impact of the energy efficiency (EE) on the massive MIMO system.

Due to the difficulty in collecting accurate circuit power consumption parameters in practical communication systems, this letter investigates energy efficiency (EE) optimization with no knowledge of the circuit power consumption in massive MIMO systems. First, the influence of the imperfect estimation of circuit power consumption on the EE optimization is analyzed. It ...

However, there exist notable technical challenges in practical applications of mmW-mMIMO systems. One of the main concerns is the high system complexity and the energy consumption arising from the employment of large-scale mmW antenna arrays [11], which often relies on efficient precoding techniques [12].Although a desirable system performance may be ...

On this basis, establishes a power consumption model in which the circuit power consumption is constant to study the EE of massive MIMO systems and draws the conclusion ...

In massive MIMO systems, energy efficiency (EE) and spectral efficiency (SE) can be balanced by tuning the number of the transmit antennas and the transmit power. ... The parameter of the circuit power consumption follows [7, 12]. 4.1 Conventional massive MIMO under simplified statistical channel model. To compare with the EE-SE tradeoff, we ...

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Massive multiple-input and multiple-output systems combined with hybrid beamforming technique is a key approach to achieve high data rate and extended cell coverage in the fifth generation (5G) cellular networks . Specifically, the precoding for analog/digital hybrid beamforming technique is absolutely essential for millimeter-wave (mm-wave) frequency ...

This thesis will study energy efficiency and spatial efficiency in massive MIMO based on three pre-coding algorithms including MRC, MMSE and ZF in mathematical and simulation approches.

Abstract: It was shown that the required transmit power to support a target achievable rate is inversely proportional to the number of antennas in massive multiple-input multiple-output (MIMO) systems [1]. However, the consumed power of the massive MIMO systems should include not only transmit power but also the fundamental power for operating the circuit at the transmitter, ...

maximize energy efficiency. An analysis of the massive MIMO 5G radio energy consumption at different loads reveals under what specific conditions 6G should outperform 5G, setting qualitative energy efficiency design goals for 6G. Following this, we propose some design principles for the 6G, focusing on novel operational,

is implementable in real-time testbeds. Massive MIMO sys-tem shows many advantages over MIMO systems low power consumption because of enlarged antenna aperture and improved network capacity [2]. So far, efficient modeling of power consumption is a protuberant apprehension of these systems. Especially, in mobile UEs, the battery technol-