# Task Scheduling in 5G MEC Networks

Task scheduling in 5G mobile edge computing (MEC) is essential for optimizing resource utilization, ensuring low latency, and supporting massive device connectivity. As 5G networks provide ultra-reliable low-latency communication (URLLC) and massive machine-type communication (mMTC), efficient task scheduling mechanisms are crucial for meeting the diverse demands of applications such as IoT, autonomous vehicles, and UAV-assisted networks. The growing integration of UAVs in 5G MEC brings additional layers...

**Key Papers on 5G Task Scheduling in MEC**

1. Service Provisioning for UAV-Enabled Mobile Edge Computing (MEC):

This paper emphasizes the role of UAVs as mobile edge servers, aiding in service provisioning for devices with constrained computational resources. The scheduling algorithms focus on offloading tasks from ground devices to UAVs, prioritizing energy efficiency and low latency. It highlights how UAVs can adapt their trajectories to better serve mobile users while considering task execution deadlines.

2. Towards Energy-Efficient Scheduling of UAV and Base Station Hybrid Enabled MEC:

The paper presents a hybrid UAV and base station (BS) enabled architecture where task scheduling is optimized for energy efficiency. It examines how tasks are distributed between UAVs and ground BSs based on energy constraints, making the system highly adaptive in environments with fluctuating energy resources.

3. Energy Optimization in Massive MIMO UAV-Aided MEC-Enabled Vehicular Networks:

This paper integrates massive multiple-input multiple-output (MIMO) technology with UAV-assisted

MEC in vehicular networks. The focus is on energy-efficient task scheduling, leveraging MIMO's spatial multiplexing to handle multiple tasks simultaneously while maintaining a low energy footprint.

4. Intelligent Ubiquitous Network Accessibility for Wireless-Powered MEC in UAV-Assisted Beyond 5G (B5G) Networks:

In this paper, UAV-assisted MEC is examined within the context of wireless-powered networks. The focus is on scheduling tasks in an energy-efficient manner while ensuring network accessibility in Beyond 5G (B5G) environments. The paper introduces intelligent scheduling algorithms that factor in the UAVs energy harvesting capabilities and their impact on task completion times.

**Challenges in Task Scheduling for 5G MEC**

**1. Dynamic Network Topology: The mobility of UAVs introduces constant changes in network topology, making it difficult to develop static scheduling algorithms. Dynamic scheduling that can adapt in real time to changing UAV positions and network conditions is essential but complex to implement.**

**2. Energy Constraints: UAVs are inherently limited by their battery life. Scheduling algorithms must balance computational tasks with the energy required for flight and communication, especially in large-scale 5G networks.**

**3. Latency-Sensitive Applications: 5G MEC is designed to support applications with stringent latency requirements, such as autonomous vehicles and real-time video processing. Scheduling algorithms need to ensure that offloaded tasks are processed within acceptable latency bounds.**

**4. Resource Allocation: Managing computational resources (CPU, memory) and**

**communication resources (bandwidth, spectrum) in 5G networks is a challenging task. Scheduling algorithms must consider how to offload tasks for maximum efficiency, especially with intermittent UAV coverage.**

**Future Directions and Scope**

**1. AI-Driven Scheduling: Machine learning techniques, such as reinforcement learning (RL), can optimize real-time decision-making for task scheduling, predicting network conditions and maximizing efficiency.**

**2. Collaborative UAV Networks: Future research should focus on collaborative UAV networks where multiple UAVs coordinate to optimize task scheduling, trajectory planning, and resource sharing.**

**3. Energy Harvesting Techniques: Integrating energy harvesting techniques into UAVs will enable more sustainable UAV-enabled MEC networks. Scheduling algorithms could prioritize tasks based on available energy resources.**

**4. 5G-Advanced and Beyond 5G (B5G): With the evolution into 5G-Advanced and B5G networks, task scheduling algorithms will need to be enhanced to support ultra-dense networks and new use cases, such as holographic communications and real-time AI-driven applications.**