**Strategies for Deployment of Unmanned Aerial Vehicle Base Stations (UAV-BS)**

**An Unmanned Vehicle Base Station is an aerial antenna system that acts as a point of contact between backhaul and access network.**

**Importance and applications of UAV-BS :-**

**They enable a network designer to create on-demand networks in a demarcated area that caters to particular users. They have a plethora of applications such as :-**

**:- They enable dual sided Information flow in IoT scenarios or other network systems where long range connectivity is not easily possible**

**:- They increase the capacity and efficiency of the existing terrestrial networks especially in crowded areas.**

**:-  They are a cost effective medium of information transfer between distant data centres and even to geographically remote areas.**

**The advantages over terrestrial and other static networks include their features like cost-effectiveness, high mobility, adaptive altitude and symmetric rotation which enable the users to have required qualities like lesser interference , durability and extended capacity.**

**Referred Paper: Predictive Deployment of UAV Base Stations in Wireless Networks(IEEE link :** [**https://ieeexplore.ieee.org/document/9220821**](https://ieeexplore.ieee.org/document/9220821)**):**

**The theory in this framework is based on the weighted expectation maximization (WEM) algorithm which is used to estimate user distribution(Machine learning approach used) and the downlink traffic. Then to ensure a robust information transfer between the UAVs and Base Station, using this an offload contract is developed, referring to which the necessary and sufficient conditions for a feasible contract are then derived. Following this an optimization problem is formulated which is used to deploy a UAV into the hotspot area such that the utility of the BS can be enhanced and maximized. The WEM method has a significantly better accuracy in its predictions.**

**Technical Results of the above approach :According to the simulation results, the WEM approach gives a prediction error of about 10% which is lower when compared with the K-mean scheme and the Expected Maximisation scheme. Also, the total utility of the UAVs under this approach is much higher than the baseline approaches of k-mean and EM. Now as the cost per UAV decreases in this approach the total revenue also increases, hence making this an economically suitable alternative.**

**Other works:**

**:-Optimal Transport Theory(power efficient approach)**

**:- UAV-aided offloading(Throughput maximizing approach)**

**Specifically, the alternative methods of the stated WEM approach are the baseline approaches of the Closest-UAV scheme and the Maximum Energy scheme. The stated approach is more efficient in UAV deployment which helps in reducing communication congestion in cellular networks, provides increased efficiency in terms of the downlink capacity, energy consumption, and service delay and is even economically advantageous on both the BS and UAV operators as compared with the two baseline approaches.**

**Open Issues:**

**The prediction error of about 10% still has to be reduced to less than 5% as the functions are highly location specific and require reliable accuracy .Also, more energy efficient approaches must be looked into and service delay must be reduced than the current values.**

**References:-**

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:-Z. Xiao, H. Dong, L. Bai, D. O. Wu and X. Xia, "Unmanned Aerial Vehicle Base Station (UAV-BS) Deployment With Millimeter-Wave Beamforming," in *IEEE Internet of Things Journal*, vol. 7, no. 2, pp. 1336-1349, Feb. 2020, doi: 10.1109/JIOT.2019.2954620. (<https://ieeexplore.ieee.org/document/8907440>)

:-The coverage method of unmanned aerial vehicle mounted base station sensor network based on relative distance(<https://journals.sagepub.com/doi/full/10.1177/1550147720920220>)

:-Distributed Collaborative 3D-Deployment of UAV Base Stations for On-Demand Coverage(https://dl.acm.org/doi/10.1109/INFOCOM41043.2020.9155283)