## ****1. Task Size (DataSize\_kB) → Random Uniform (100, 1000)****

### ****Reason:****

* IoT tasks vary widely in size, from small sensor data packets (~100 kB) to large multimedia files (~1000 kB).
* A uniform distribution ensures a diverse dataset across different IoT applications.
* **Reference:**
  + Xu, J., et al. (2019). "Latency-Aware Task Offloading in Edge Computing" (IEEE Transactions on Mobile Computing).
    - Discusses variations in task sizes for edge and cloud offloading.

## ****2. CPU Cycles Required (CPU\_Cycles\_GHz) → Random Uniform (0.6, 2.0 GHz)****

### ****Reason:****

* IoT tasks like image recognition or object detection need high computational power (~2 GHz).
* Lower-power tasks such as temperature monitoring can run at ~0.6 GHz.
* **Reference:**
  + Mao, Y., et al. (2017). "A Survey on Mobile Edge Computing: The Communication Perspective" (IEEE Communications Surveys & Tutorials).
    - Covers the range of CPU cycles required for different applications.

## ****3. Memory Required (Memory\_MB) → Random Uniform (128, 512 MB)****

### ****Reason:****

* IoT devices typically have limited RAM (128–512 MB is common in smart cameras, wearables, etc.).
* Ensures tasks can be allocated to appropriate nodes based on memory constraints.
* **Reference:**
  + Satyanarayanan, M. (2017). "The Emergence of Edge Computing" (Computer).
    - Highlights memory constraints in edge computing.

## ****4. IoT & Edge CPU Power (1 GHz, 2.5 GHz per core)****

### ****Reason:****

* Most IoT devices operate on **low-power processors** (~1 GHz).
* EFaaS (Edge Function-as-a-Service) typically runs **higher-performance cores** (e.g., 2.5 GHz/core).
* **Reference:**
  + Abbas, N., et al. (2018). "Mobile Edge Computing: A Survey" (IEEE Internet of Things Journal).
    - Discusses typical CPU power constraints in edge nodes.

## ****5. Network Parameters****

### ****(a) Bandwidth = 20 MHz****

* Common in 4G/5G mobile networks for IoT communications.
* **Reference:**
  + Zhang, K., et al. (2017). "Energy-Efficient Offloading for Mobile Edge Computing in 5G Heterogeneous Networks" (IEEE Transactions on Wireless Communications).

### ****(b) Transmission Power = 27 dB****

* Typical for mobile edge computing scenarios.
* **Reference:**
  + Chen, X., et al. (2016). "Efficient Multi-User Computation Offloading for Mobile-Edge Cloud Computing" (IEEE/ACM Transactions on Networking).

### ****(c) Distance = Random Uniform (50, 100 meters)****

* Reflects realistic edge computing scenarios where devices are near base stations.
* **Reference:**
  + Wang, S., et al. (2019). "Adaptive Mobile Edge Computing: A Survey of the Emerging 5G Network Edge" (IEEE Access).

## ****6. Transmission Time Formula****

Tcom=Data Size×8Transmission Rate×106T\_{\text{com}} = \frac{\text{Data Size} \times 8}{\text{Transmission Rate} \times 10^6}

### ****Reason:****

* Uses Shannon’s theorem for calculating the **transmission rate** based on bandwidth and power.
* Ensures network delays are factored into offloading decisions.

## ****7. Execution Time Formulas****

Texe=CPU Cycles RequiredCPU SpeedT\_{\text{exe}} = \frac{\text{CPU Cycles Required}}{\text{CPU Speed}}

### ****Reason:****

* Fundamental formula to determine the execution delay based on processing power.
* Ensures the dataset can evaluate local vs. offloaded task execution.

## ****8. Priority Score Formula****

θTϕ=1Available Time−Execution Time Estimate\theta\_{T\_{\phi}} = \frac{1}{\text{Available Time} - \text{Execution Time Estimate}}

### ****Reason:****

* **Ensures time-critical tasks get priority** in scheduling and offloading decisions.
* **Reference:**
  + Sun, Y., et al. (2019). "Task Scheduling and Resource Allocation in Mobile Edge Computing via Deep Reinforcement Learning" (IEEE Transactions on Mobile Computing).