1. WiFi threshold \( (Th_{WIFI}) \): If the WiFi link falls below this threshold the MR replacement process starts.
2. LTE-A threshold \( (Th_{LTE}) \): This threshold activates the search of a MR to support the connectivity.
3. LTE-A reactivation threshold: If the LTE-A signal surpasses this threshold then the SMN could be back to the single-hop LTE-A communication.

For the sake of simplicity, in this paper \( Th_{WIFI} \) is set to -82 dBm and the reactivation threshold equals \( Th_{LTE} \). Therefore, this section only focused on the optimization of the LTE-A threshold based on, firstly, the minimization of the number of required relays and, secondly, the maximization of the Cell-edge User Throughput (CEUT).

![Graph](image)

**Figure 5.** Threshold analysis for InH (left) and UMi (right) scenarios.

Figure 5 evaluates the Mean User Throughput (MUT) with an increasing number of MR available in the scenario\(^3\). Two scenarios (InH and UMi) and four thresholds are depicted. The number of active nodes in the cell is 10 following the guidelines provided by [19].

It can be observed that mobile relaying improves remarkably system performance. In the InH scenario, the higher the threshold is the better the performance. It is always beneficial to use a MR since, in such a small scenario, the WiFi interface exhibits higher data rates and reducing the hop length in LTE-A also improves performance. However, there is an optimum in the number of MRs, which in the InH case is around 10. With more than 10 MRs the additional diversity in the selection of the best MR does not compensate the increase in signaling. To sum up, for small scenarios the LTE-A threshold must be set as high as possible but the candidate set must be restricted to 10.

\(^3\)Note that 0 MR represents the scenario without mobile relaying.