

# From Hardware to Handovers: Mapping Smartphone Tiers to Mobility Diversity

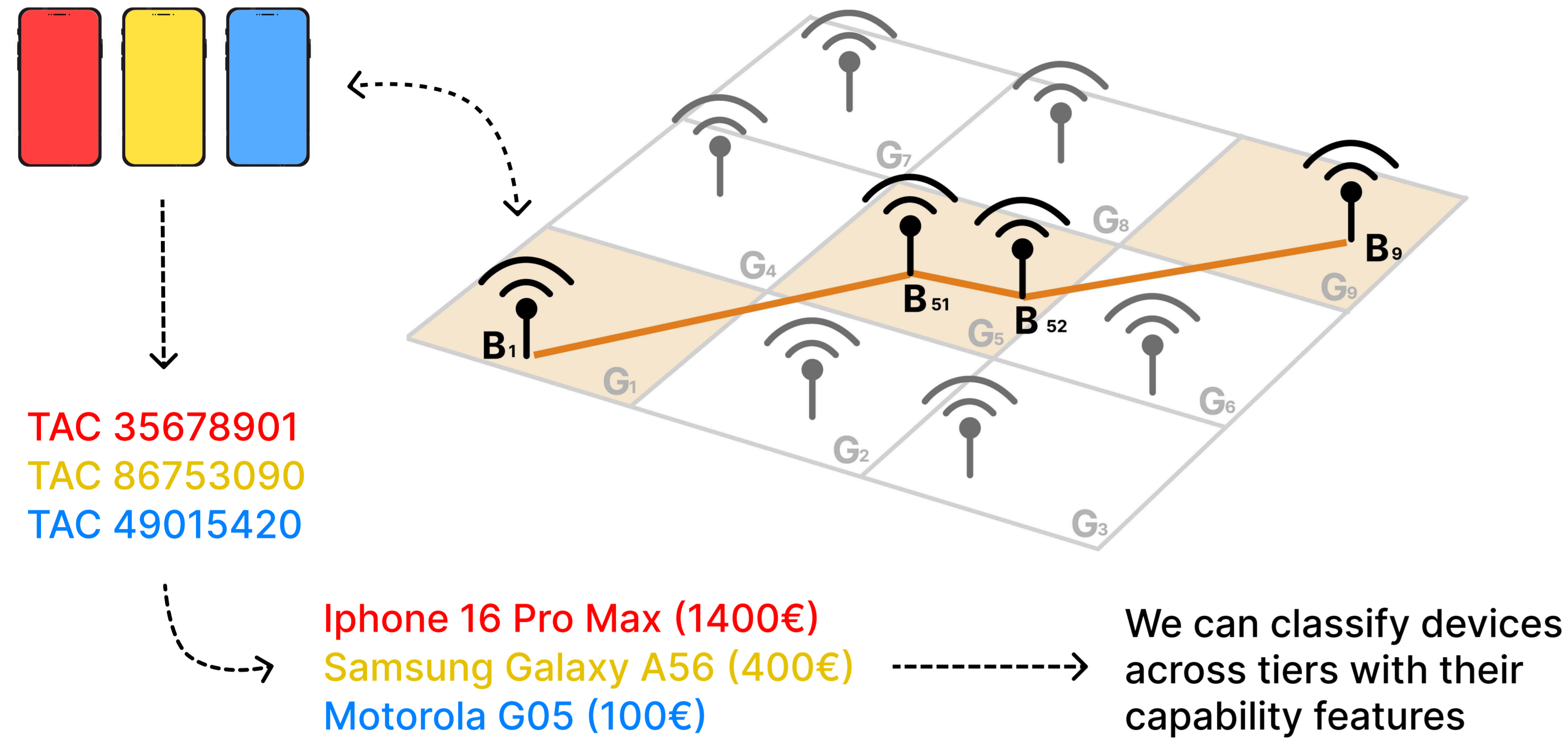
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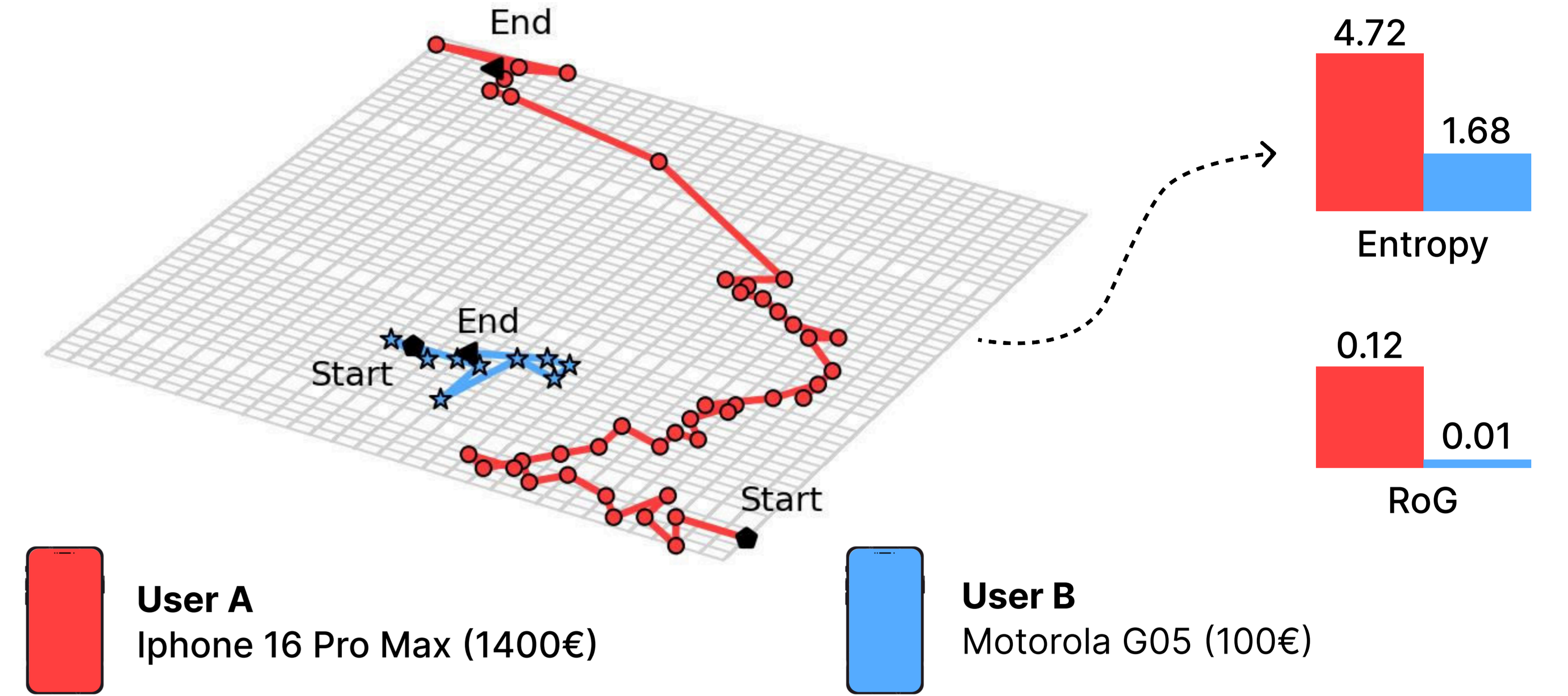


## We can explore diversity in mobility by measuring handover events

Handovers events from mobile networks give us a privileged view of UEs mobility. TAC gives a view of UE diversity

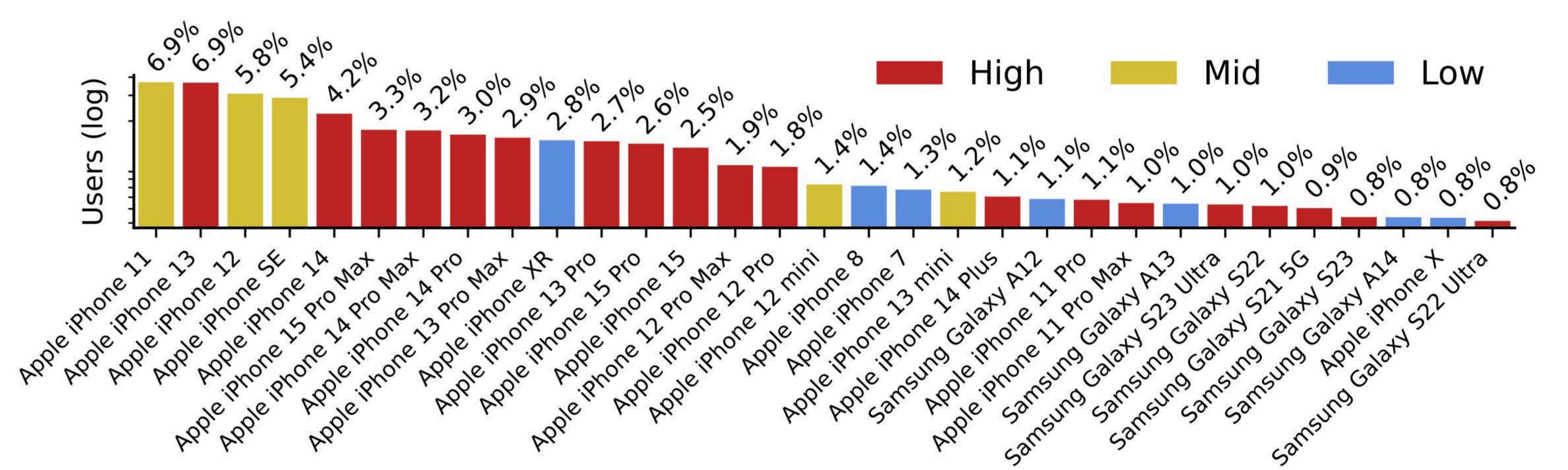
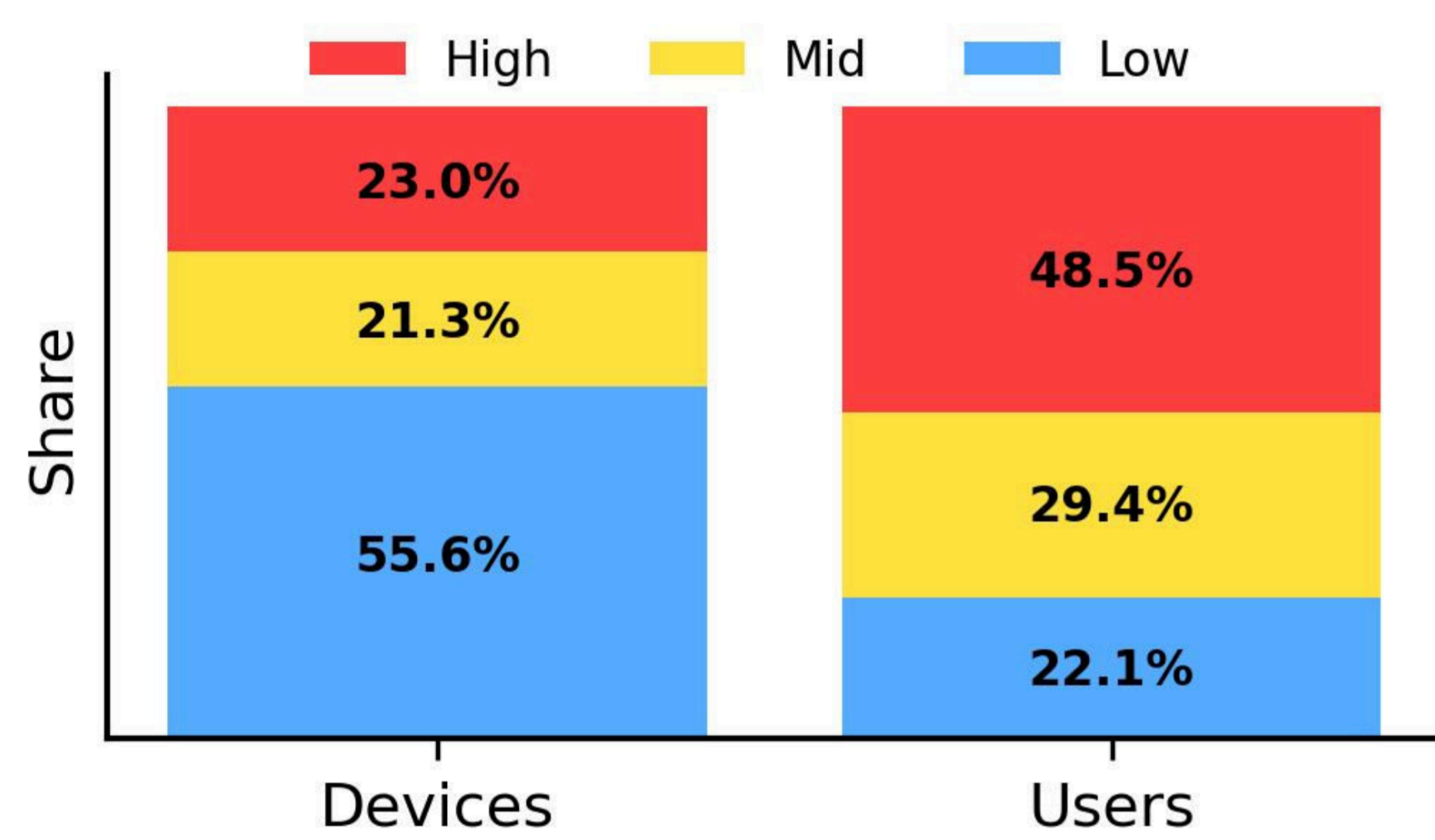


We're able to quantify the the levels of mobility across each UE, together with their device type, to characterise mobility diversity

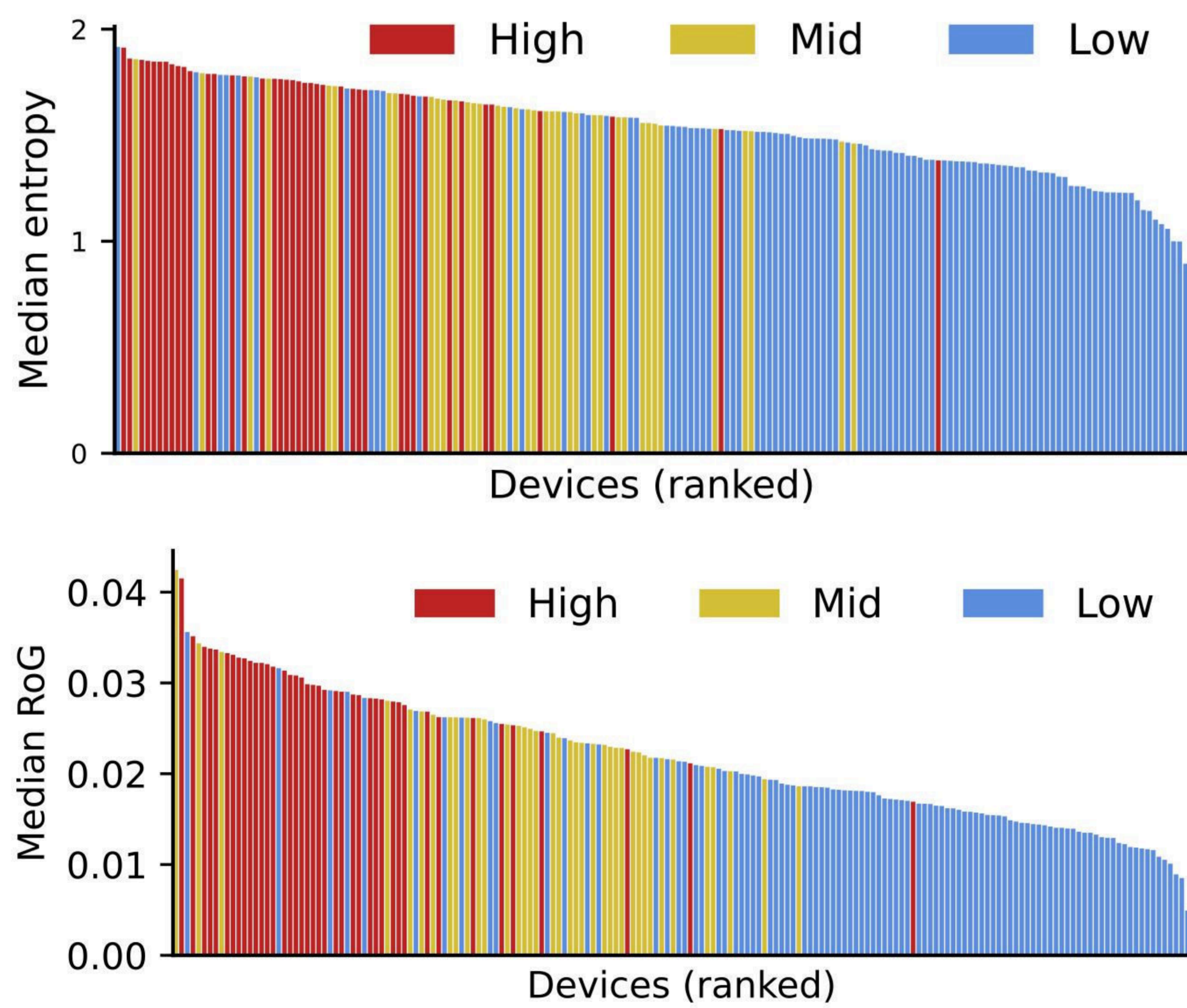


## Devices are diverse, and their capability tiers can connect directly to their mobility patterns

The UE population (located in a major EU capital) is skewed towards High tier devices, and composed of mainly Apple and Samsung devices

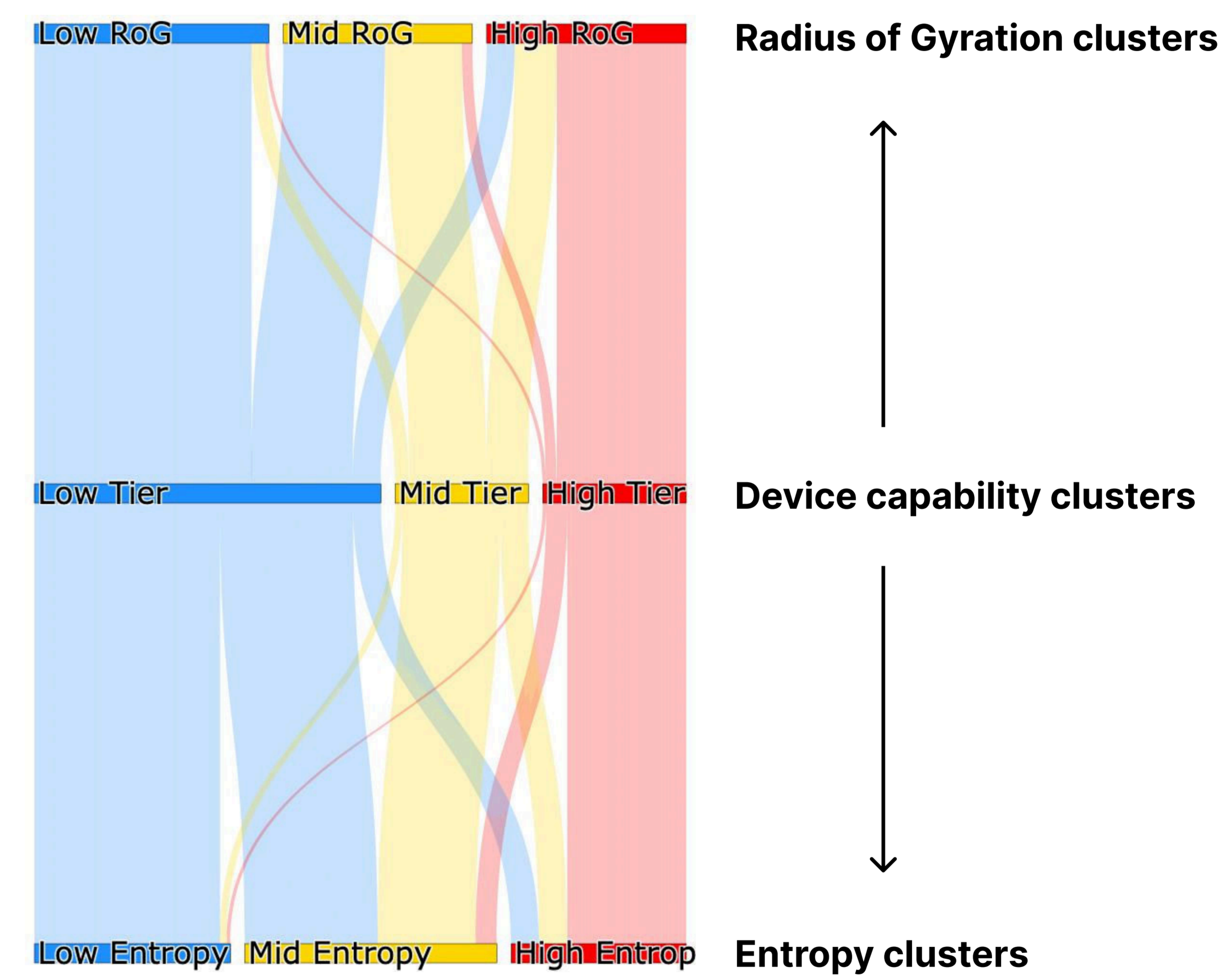


The median mobility by device type is highest for High-tier devices and decreases across Mid- and Low-tier devices



Spearman's rank correlation between the device features and mobility rankings:  
Entropy ( $\rho_s = 0.762, p < 0.001$ ) | RoG ( $\rho_s = 0.762, p < 0.001$ ).

We cluster devices by their mobility features and find direct links between their mobility cluster and their capability cluster



This is specially noticeable for High and Low tiers

## Why this matters?

1. Hardware is a proxy for mobility, which connects to socioeconomic status. Ignoring it risks deepening digital inequality.
2. This diversity in hardware and data has direct impacts on Federated learning for mobility prediction.
3. High tier devices would be naturally over-selected, and their mobility patterns over-represented. Client selection tends to prefer High tier devices for training performance

### So, what's next?

We're working on quantifying the impact of this analysis on FL systems, to propose solutions to balance inequality and improve fairness

## Acknowledgment



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