

Multicast-Driven Privacy for Network RTK: Utilizing Core Networks While Limiting Their Awareness

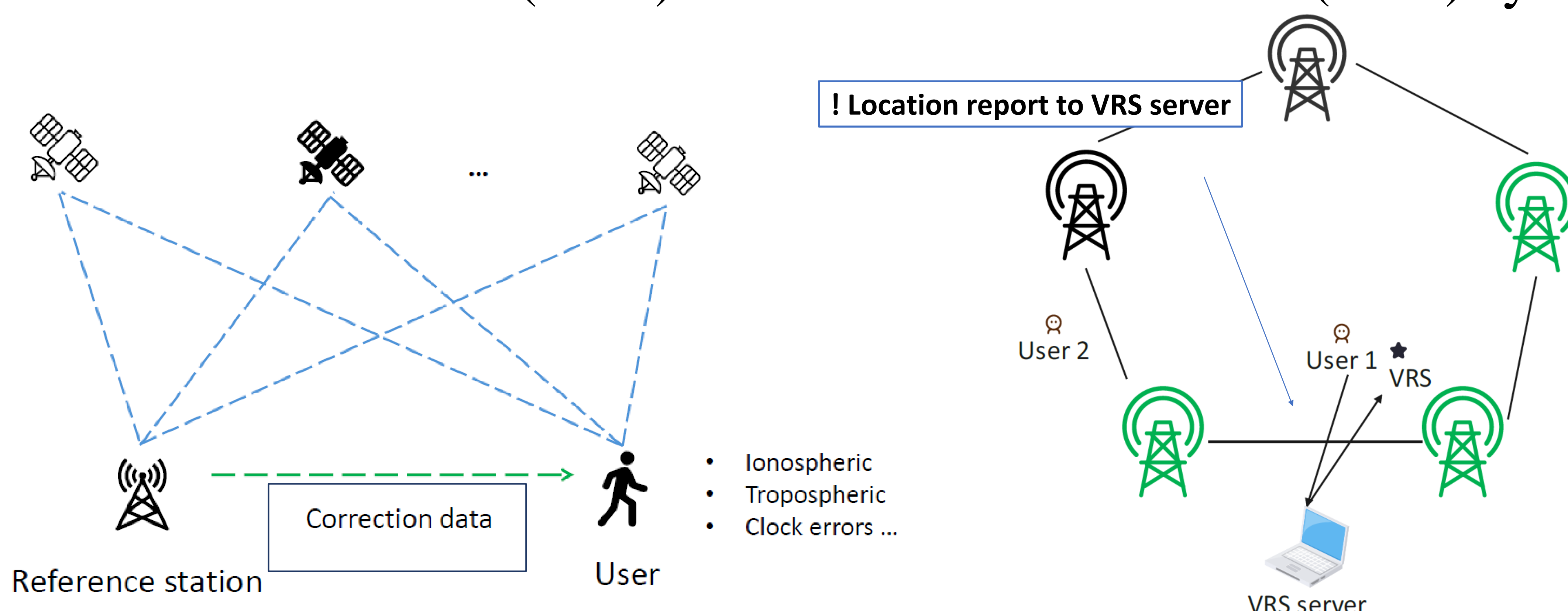
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Introduction

Real-time kinematic (RTK)& virtual reference station (VRS) system:



VRS service disadvantages

❑ User location exposure

- GNSS locations must be reported to the VRS server

❑ Inefficient transmission

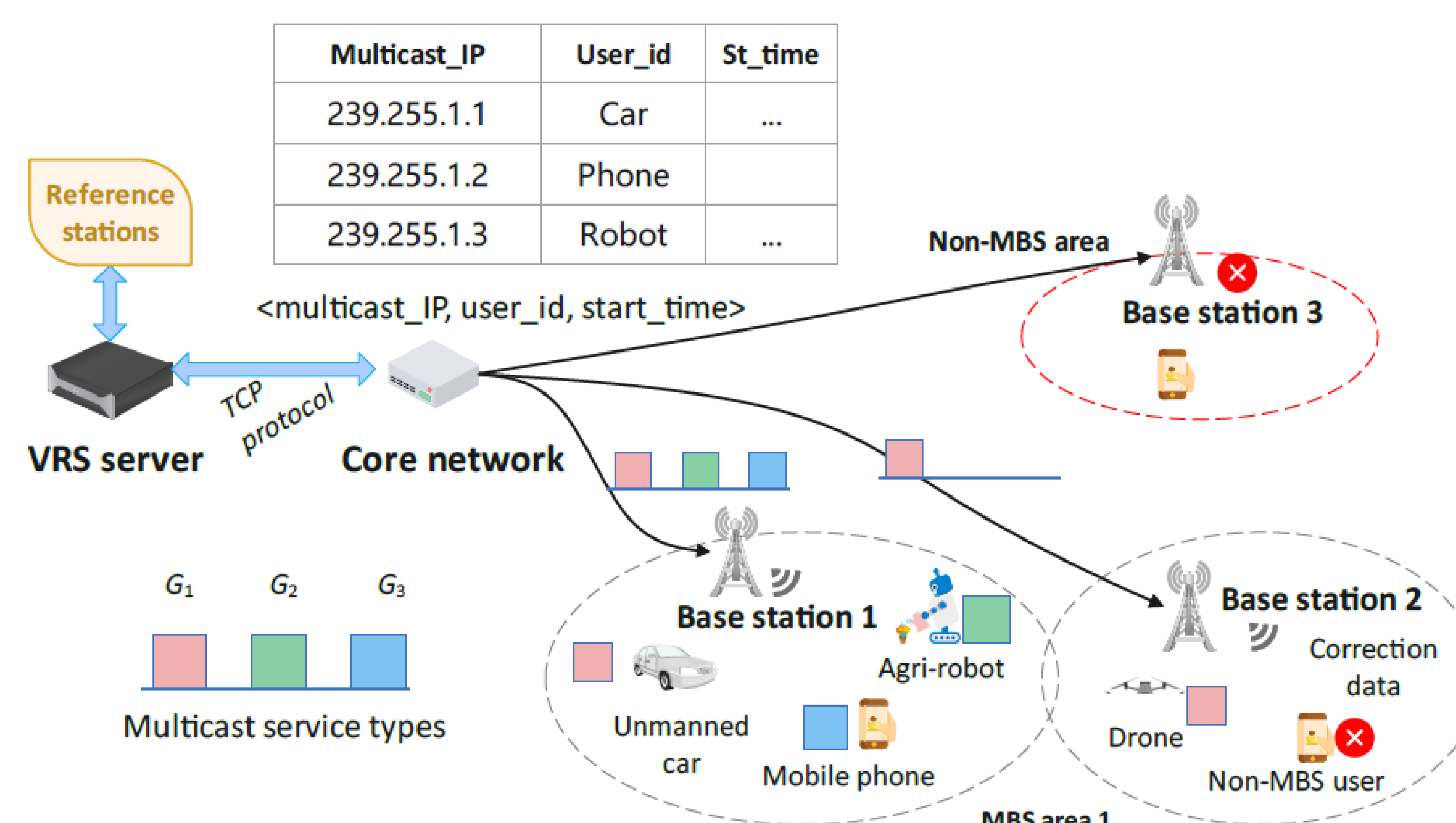
- Unicast the same correction data to nearby users in same region

❑ Accuracy loss

- VRS not update in real-time; spatial drift with movement

Scheme: Multicast-Driven Privacy for VRS service

1. CN loads correction data from the VRS server
2. Multicast correction data by base stations
3. Users join different multicast groups and receive the data



Results of scheme

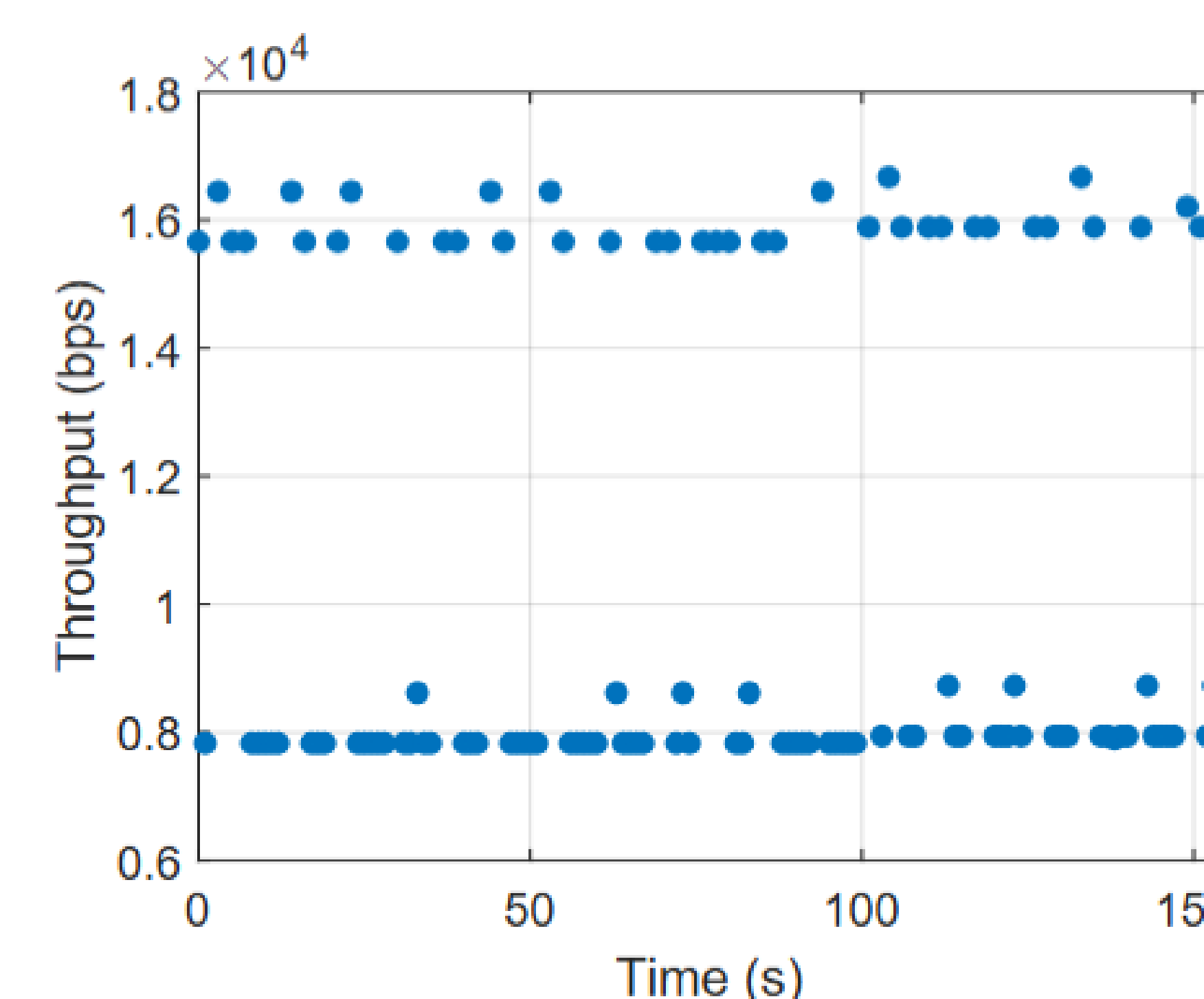
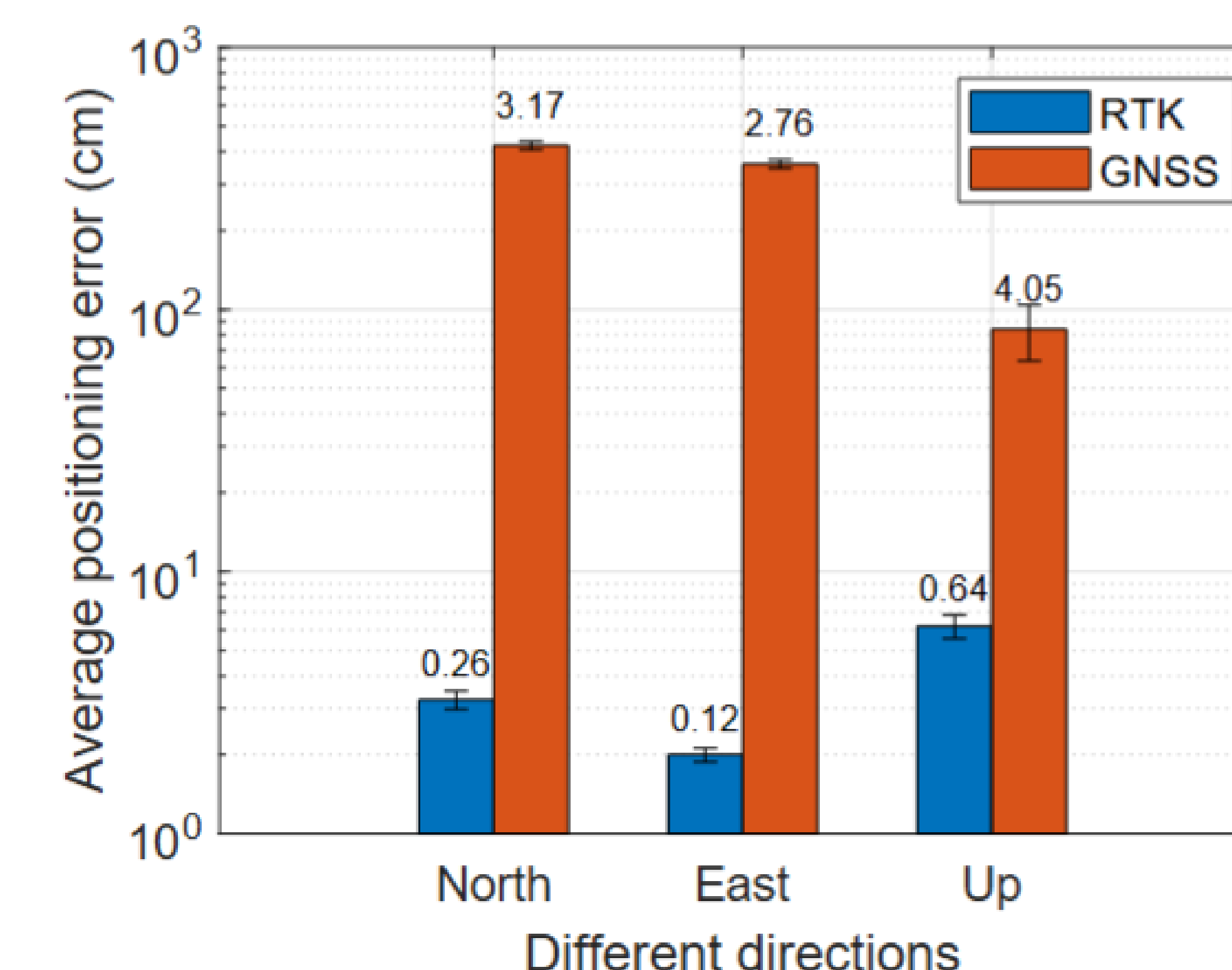


Fig. 7. System throughput over time.



Stable system throughput & High positioning accuracy

Enhanced scheme: Limiting CN's awareness

- User mobility (e1)/ Leave triggers RRC_CONNECTED (e2)
- CN knows user location
- Adjust multicast radius R
- Optimize R to minimize location exposure $Z = e1 + e2$

Results of enhanced scheme

❑ Impact of R on Z

- User speed affects optimal R

- $S=5$, $R=13$
- $S=10$, $R=20$
- $S=15$, $R=22$
- $S=20$, $R=20$
- $S=25$, $R=9$

