



Mobility Management for Inter-SNO Sharing in LEO

Satellite Networks

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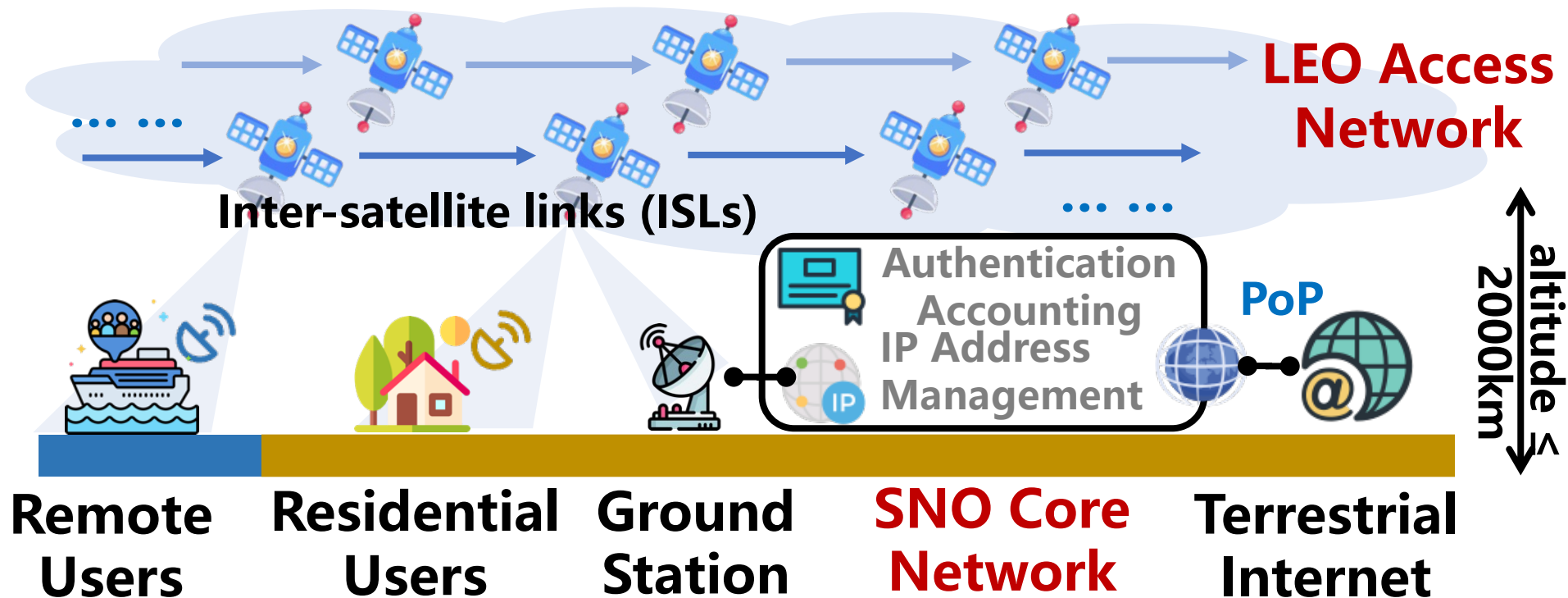
[March 16, 2026]

Outline

- **LEO Networks and SNOs**
- **Satellite Mobility and Handover**
- **Inter-SNO Collaboration and Its Challenges**
- **Our Mobility Management Solution**
- **Conclusion**

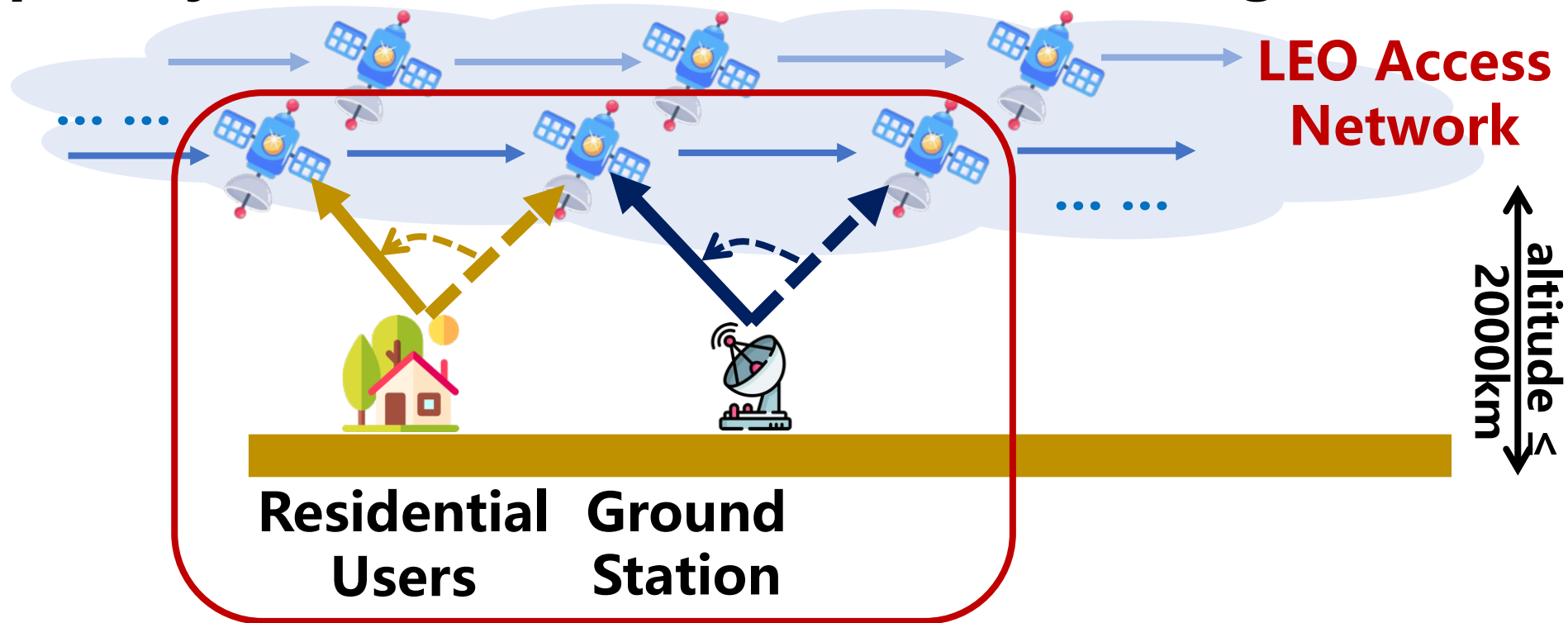
Low-Earth Orbit (LEO) Networks

- Typical LEO network architecture operated by a satellite network operator (SNO)
- Users access the Internet through the SNO core network via one or more satellites



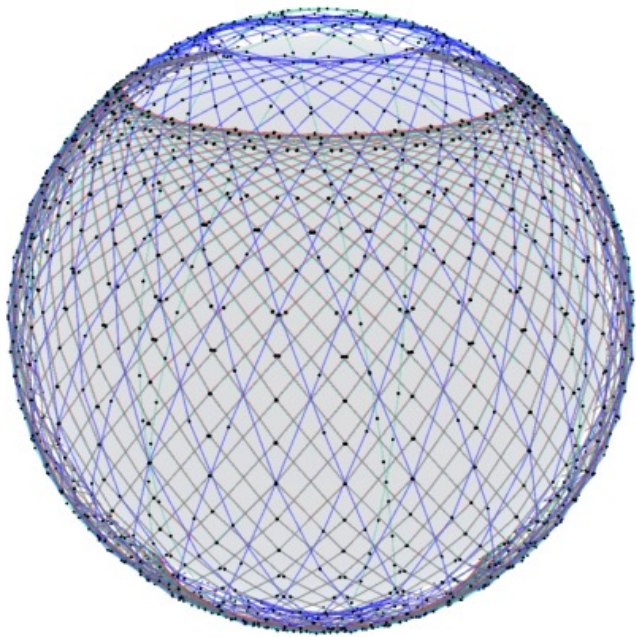
Satellite Mobility and Handover

- Due to their low orbital altitude, LEO satellites travel at extremely high speeds
- This high mobility forces user terminals and ground stations to frequently connect to new satellites, causing *Handover*

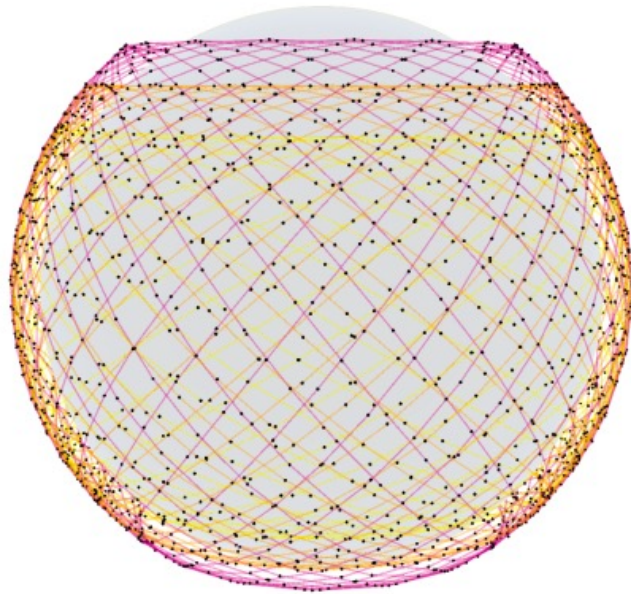


Satellite Mobility and Handover

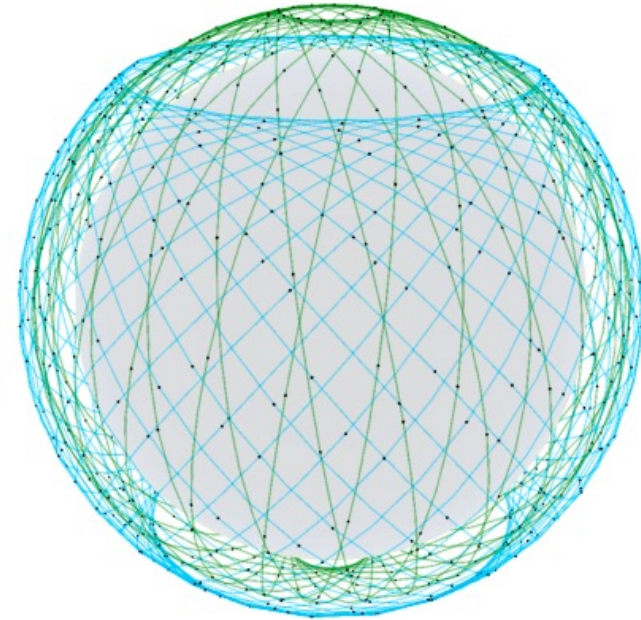
- High mobility of satellites → thousands of satellites to provide continuous global service
- For example, Starlink, Amazon LEO and Telesat



Starlink
(4408 satellites)



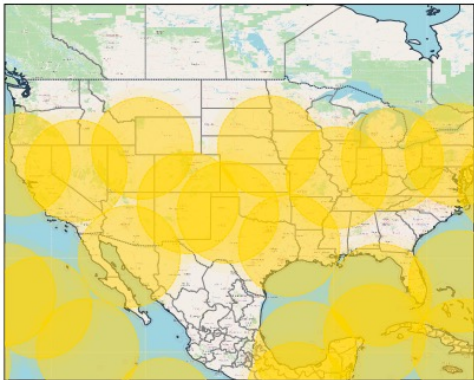
Amazon LEO
(3236 satellites)



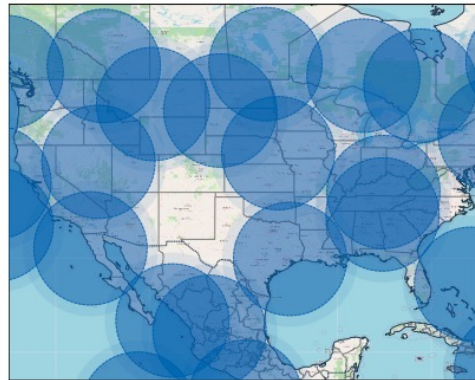
Telesat
(1671 satellites)

Inter-SNO Collaboration

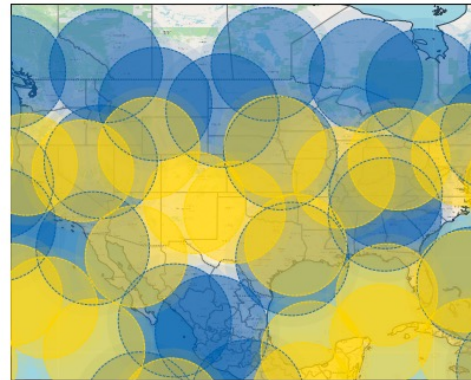
- Deploying so many satellites is **complex, time-consuming, and costly** for SNOs
- Recent trend: *inter-SNO collaboration*, where different SNOs share infrastructure to accelerate deployment



(a) Amazon LEO coverage.



(b) Telesat coverage.



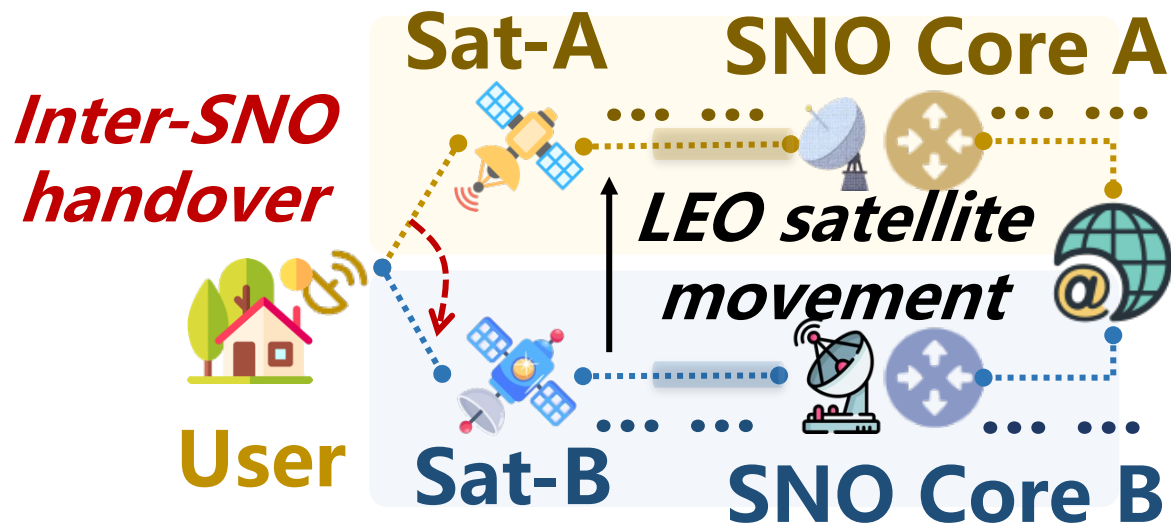
(c) SNO collaboration.

Coverage comparison

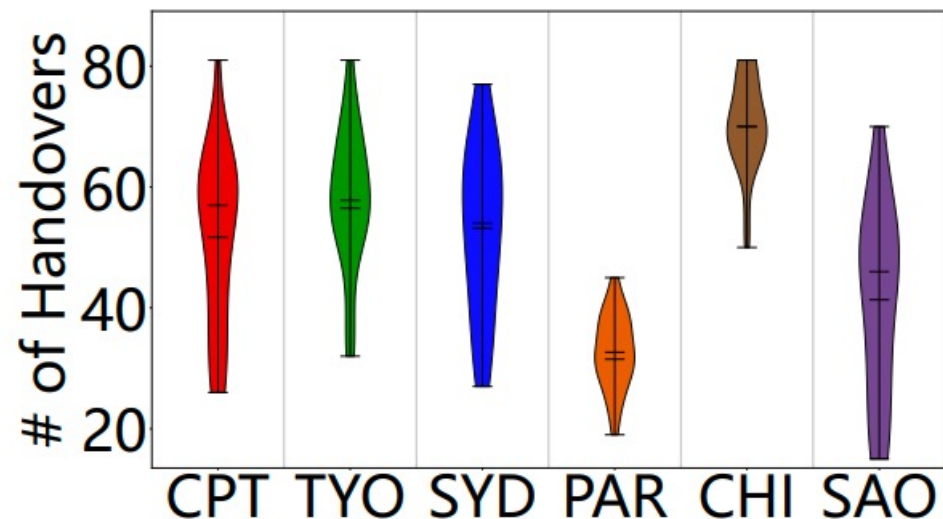
- (a) Single-SNO coverage: Amazon LEO
- (b) Single-SNO coverage: Telesat
- (c) *Inter-SNO collaborative coverage: Amazon LEO + Telesat*

Inter-SNO Collaboration Challenges Under LEO Mobility

- LEO mobility can frequently trigger **inter-SNO handovers**
- Each inter-SNO handover requires coordination across different SNO core networks
- Frequent inter-SNO handovers make seamless service continuity challenging

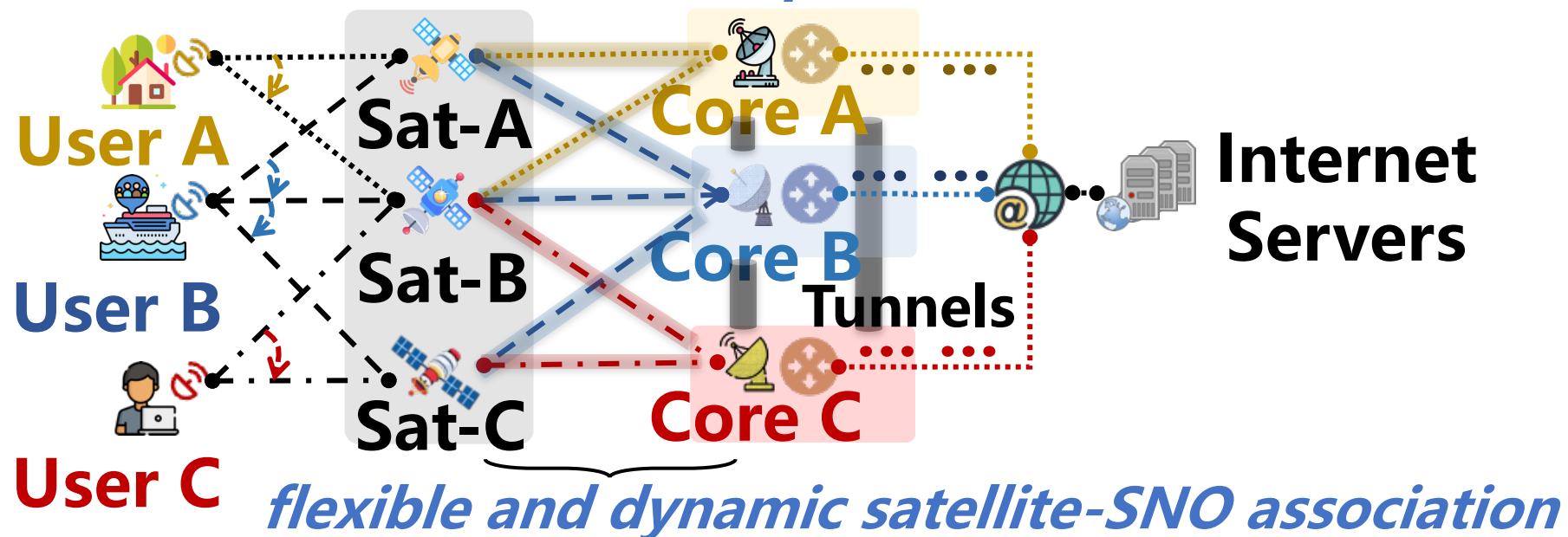


Major cities worldwide may experience 20~80 inter-SNO handovers per hour



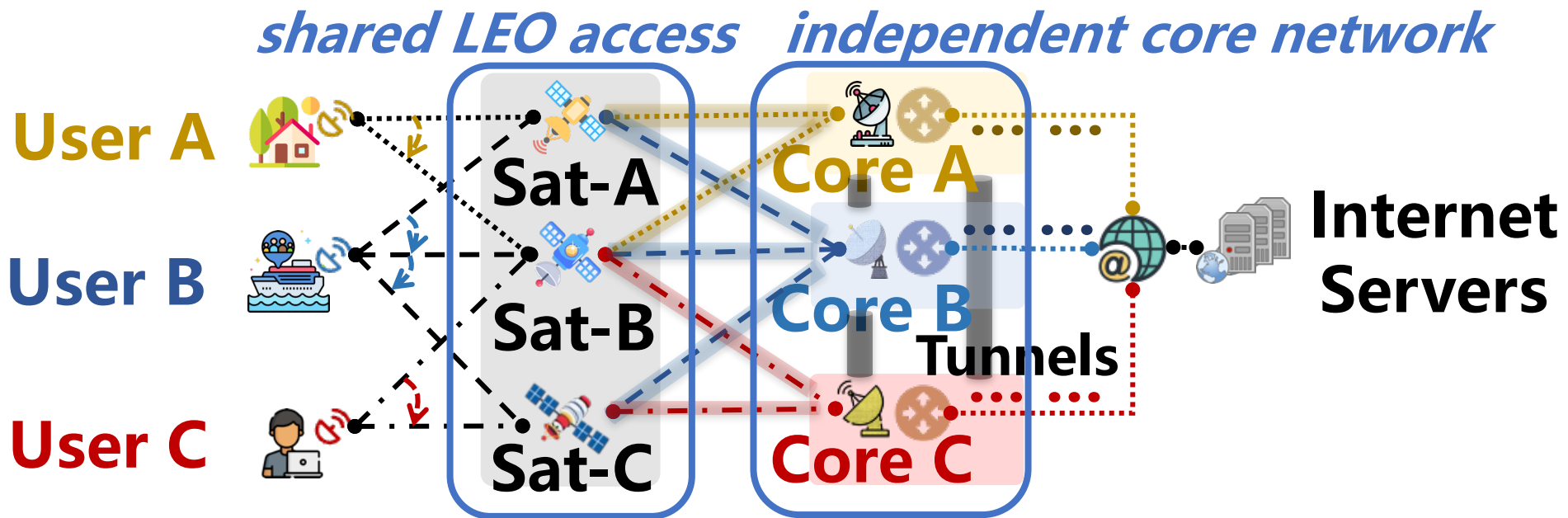
Our Proposed Mobility Management Solution

- **Two core components:**
 - **shared LEO access and independent SNO core networks**
- **A *tunneling-based* mechanism for**
- **flexible and dynamic satellite–SNO association**
shared LEO access independent core network



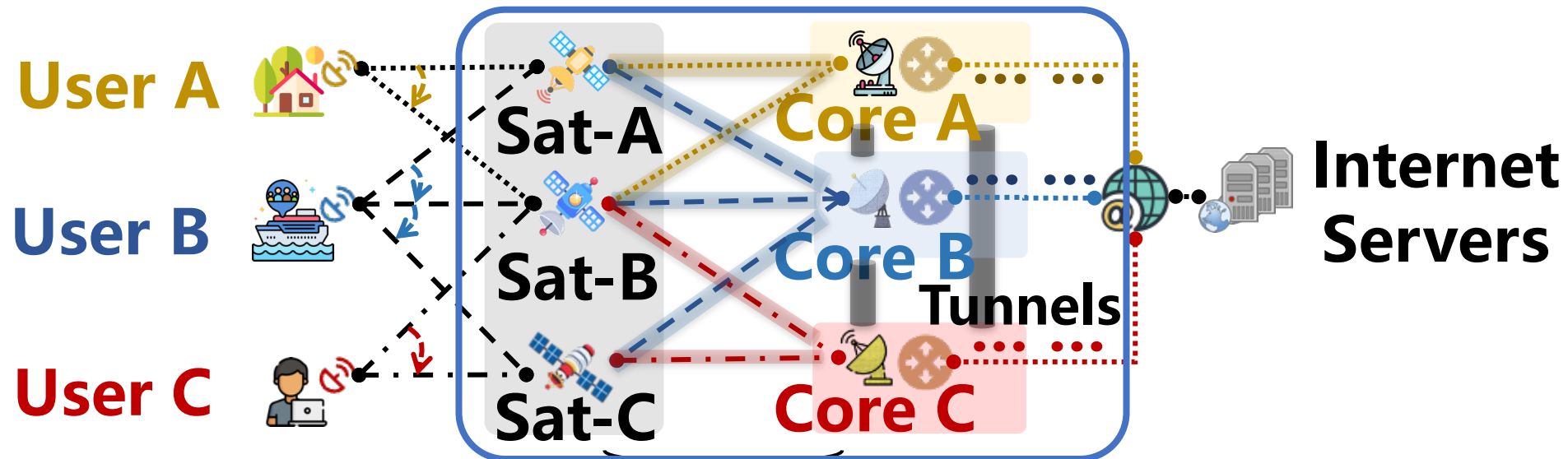
Shared LEO Access and Independent SNO Core Network

- Satellites are decoupled from individual SNOs through shared LEO access
- SNO core networks remain independent to preserve SNO-specific functions, such as authentication, accounting, and IP address management



Flexible and Dynamic Satellite–SNO Association

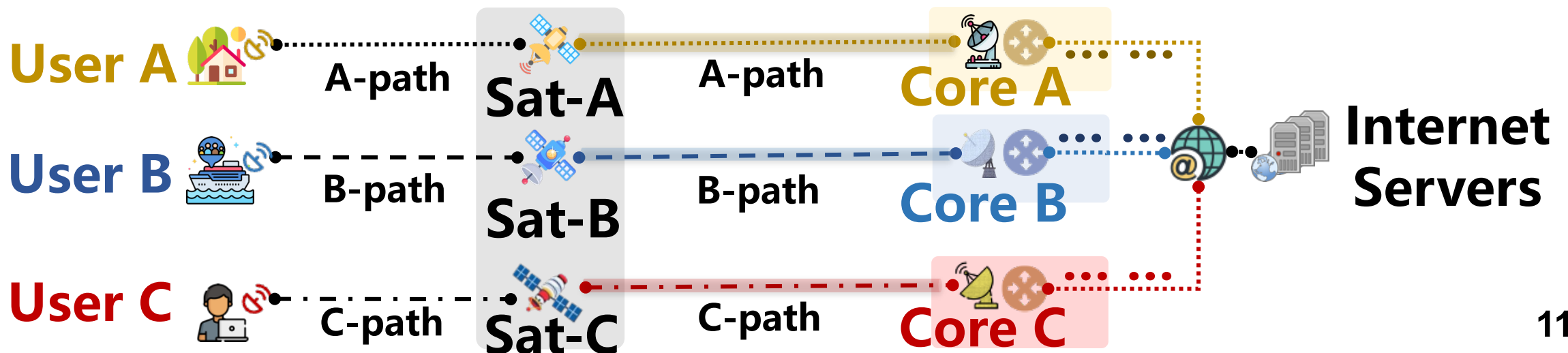
- Each satellite can be dynamically associated with different SNO core networks
- Different SNO core networks can communicate through tunnels to support dynamic satellite–SNO association



flexible and dynamic satellite-SNO association

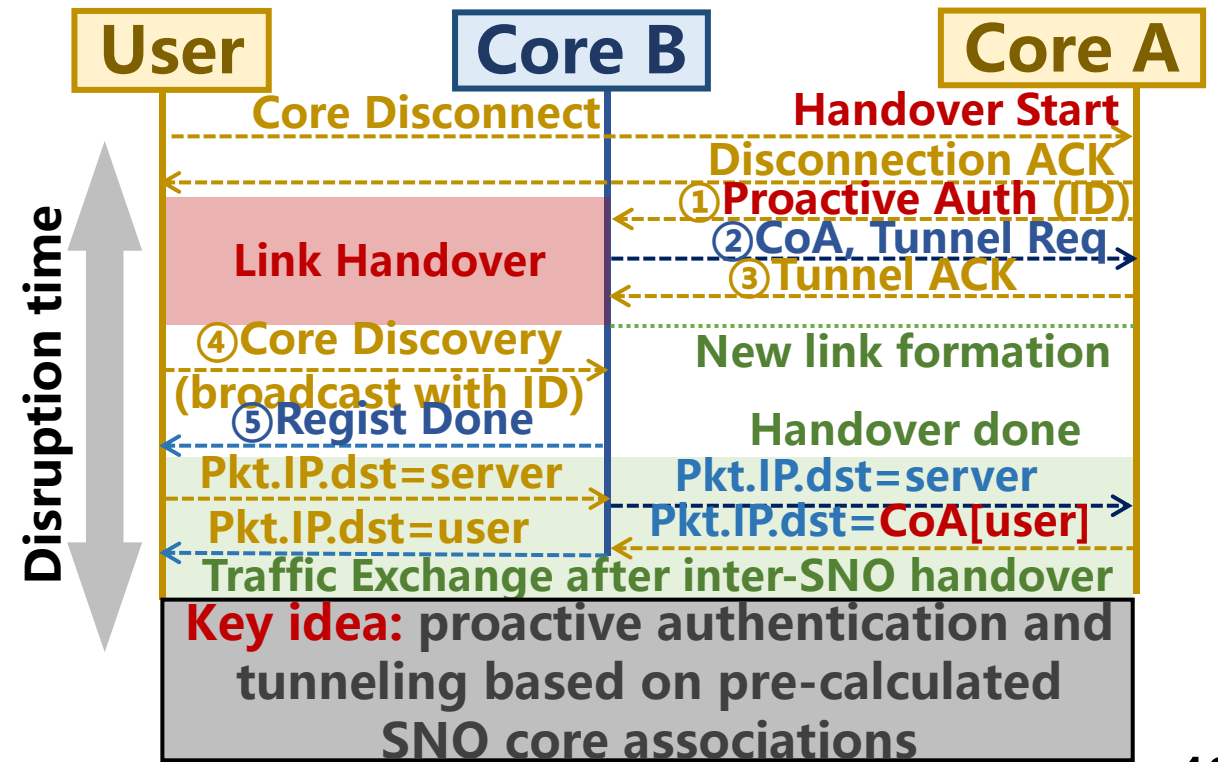
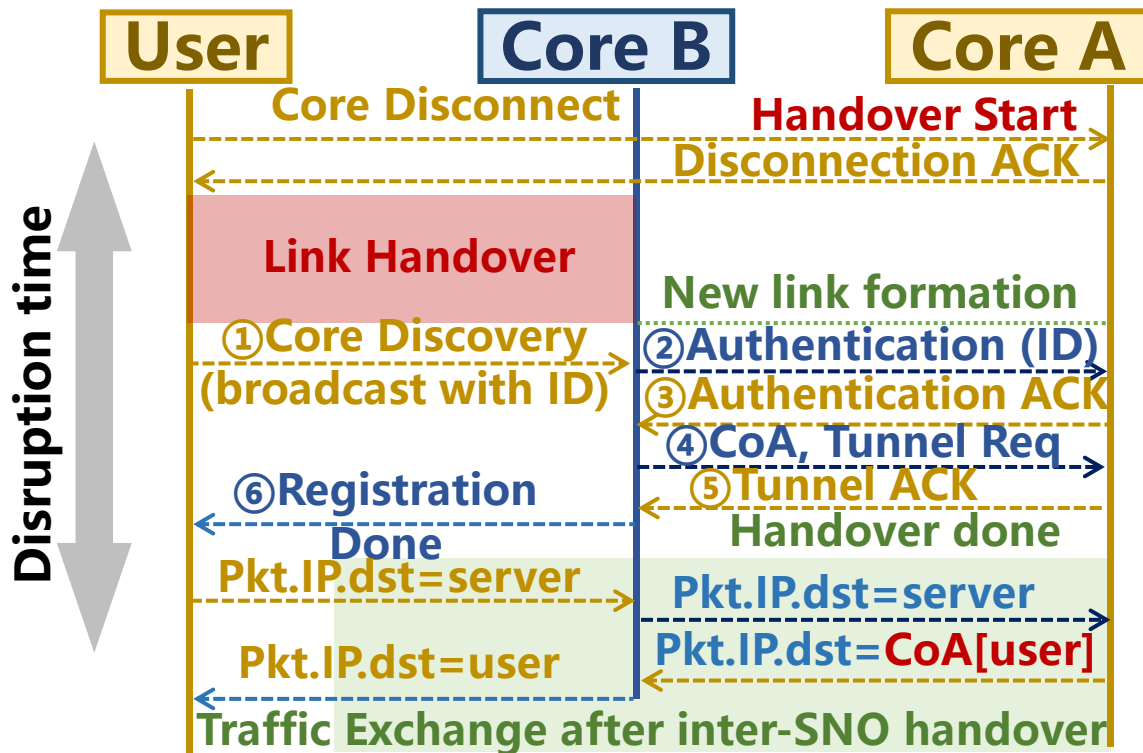
Mitigating the Impact of Inter-SNO Handovers

- *1. Reduce the number of inter-SNO handovers*
- **(1) Leverage predictable satellite trajectories**
- **(2) Consider existing user-SNO associations**
- **(3) Assign satellites to appropriate SNOs to reduce users' inter-SNO handovers**



Mitigating the Impact of Inter-SNO Handovers

- *2. Proactive switching for unavoidable inter-SNO handovers*
- **Leverage the precomputed satellite-SNO associations to enable proactive switching and reduce service disruption**



Baseline handover mechanism [RFC6275]

Optimized handover process

Conclusions

- **LEO mobility** makes inter-SNO collaboration both necessary and challenging
- We propose an architecture with **shared LEO access, independent SNO core networks**, and **flexible satellite–SNO association**
- Our solution **reduces the number of inter-SNO handovers** through trajectory-aware satellite–SNO assignment
- When handovers are unavoidable, **proactive fast switching** helps shorten service disruption

THANKS

Comments & Questions

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