

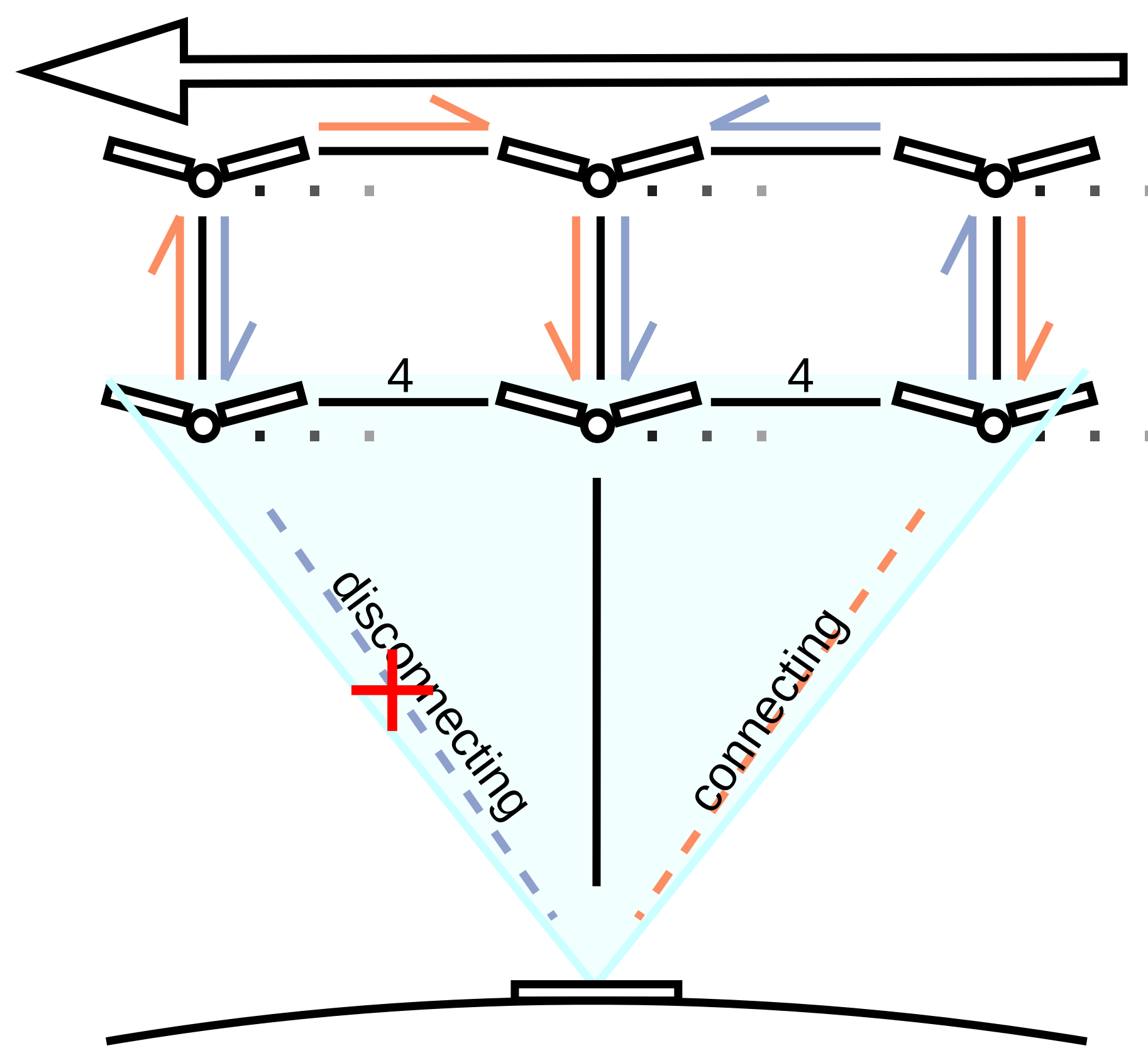
Reducing Topology Advertisements Through Ground-Station Handover Scheduling

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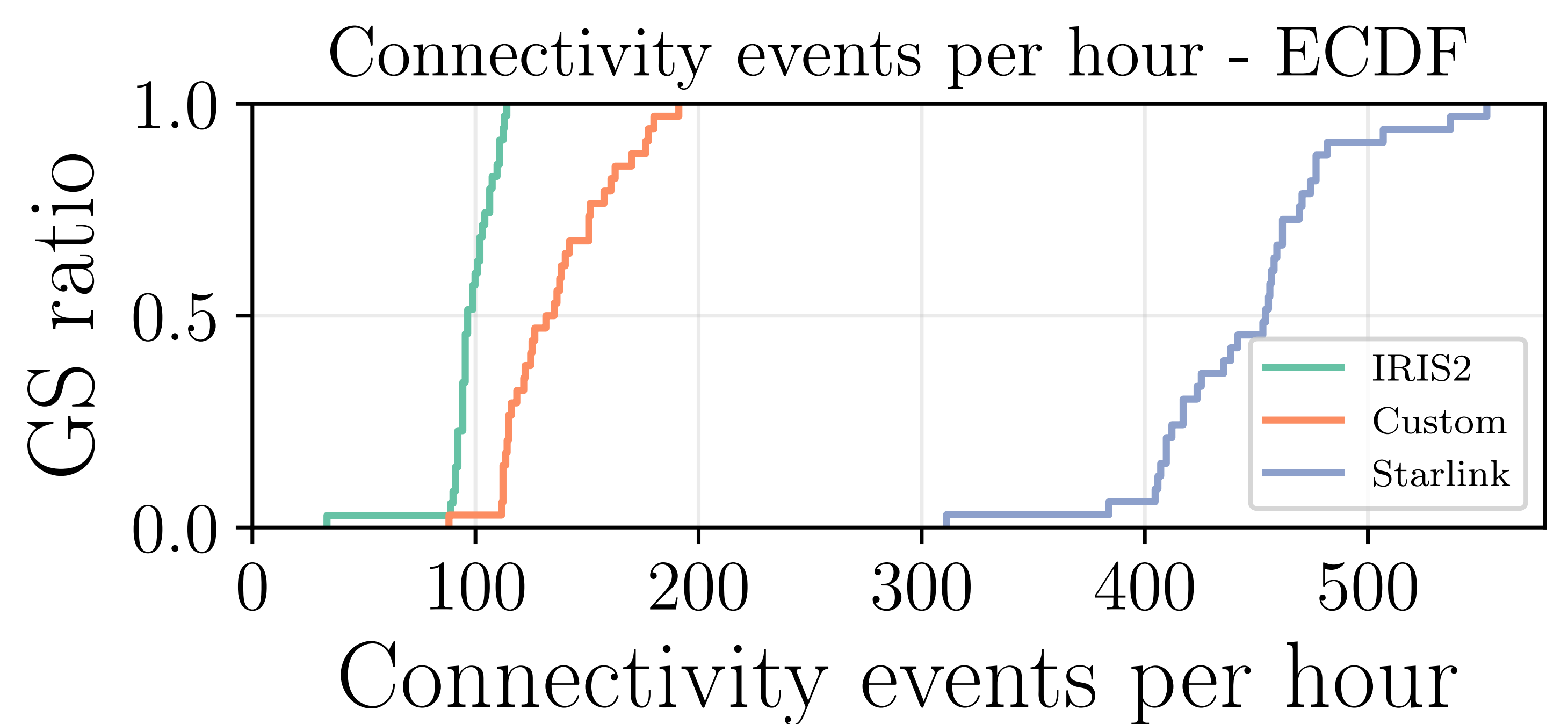
Advertising Handovers Breaks Forwarding

LEO satellites (dis)connect with Ground Stations (GS) every few minutes.



- Topology changes advertised to all satellites
- Routing convergences induce loops and packets drops
- More topology changes $\Rightarrow$ more convergences $\Rightarrow$ more forwarding issues

Feeder Link Dynamicity



Name	Constellation code [2]
IRIS2 [1]	D:1200:55:264/12/1
Custom	D:600:55:432/16/4
Starlink [3]	D:550:53:1584/72/39

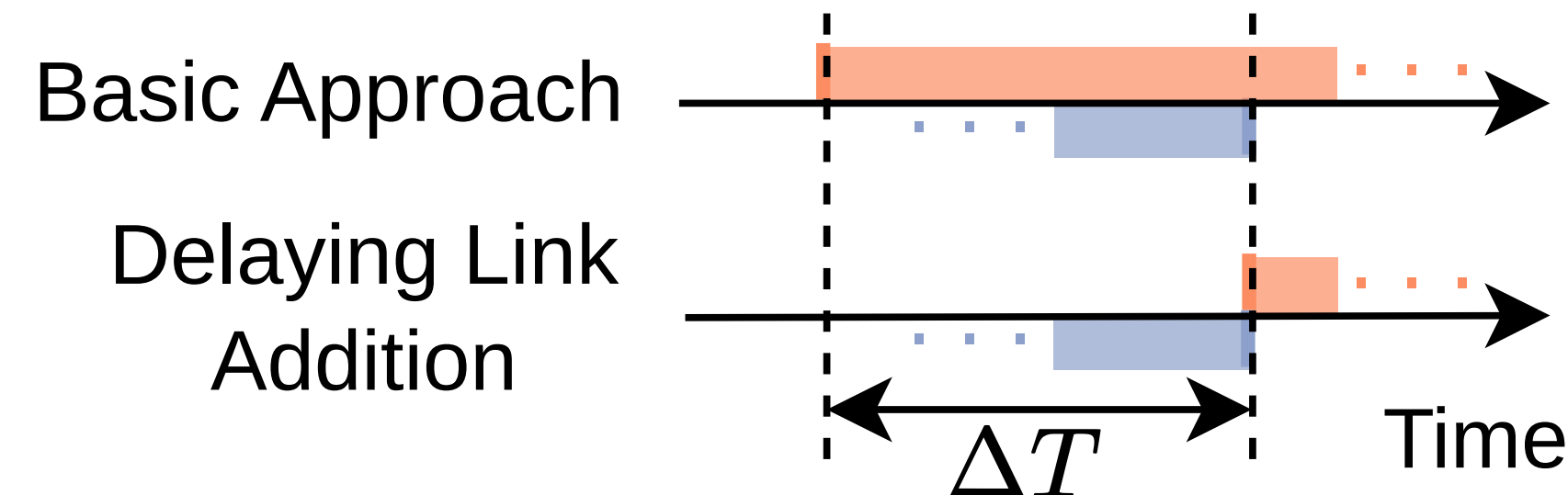
Delaying Feeder Links Establishment

Goals

Our framework balances two goals:

- **Maximise usage:** keep most feeder links established
- **Minimise connectivity events:** avoid triggering routing updates $\rightarrow$ advertising addition and removal in one update

- **Minimum lifetime required**
- **Maximum lifetime candidate**
- **Delay link addition to group with a link removal**

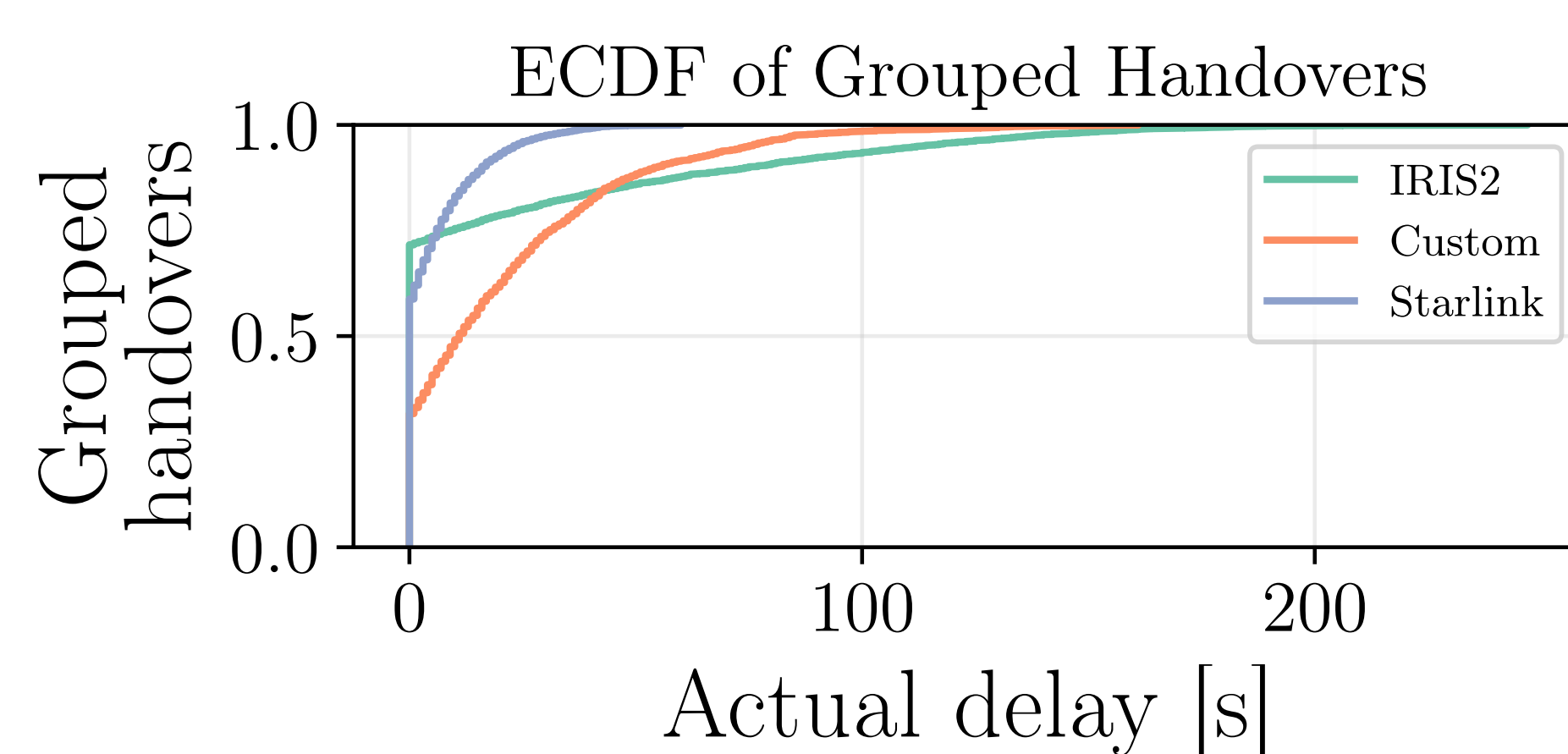
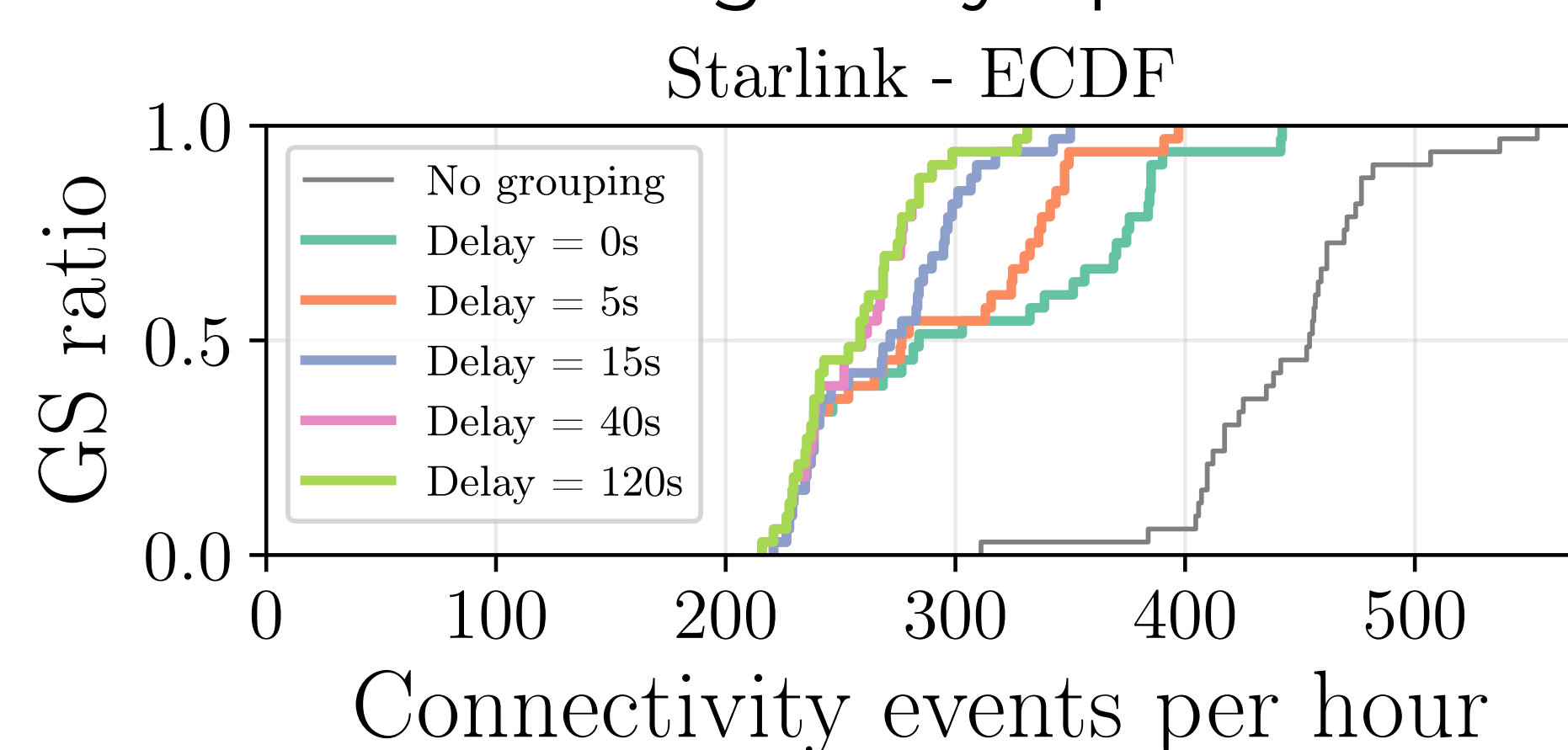


Key mechanism: Bounded Waiting Delay

Some handover sequences happen simultaneously. *MAX_DELAY* lets a ground station **deliberately wait** for such an opportunity. It trades a bounded delay for fewer topology advertisements.

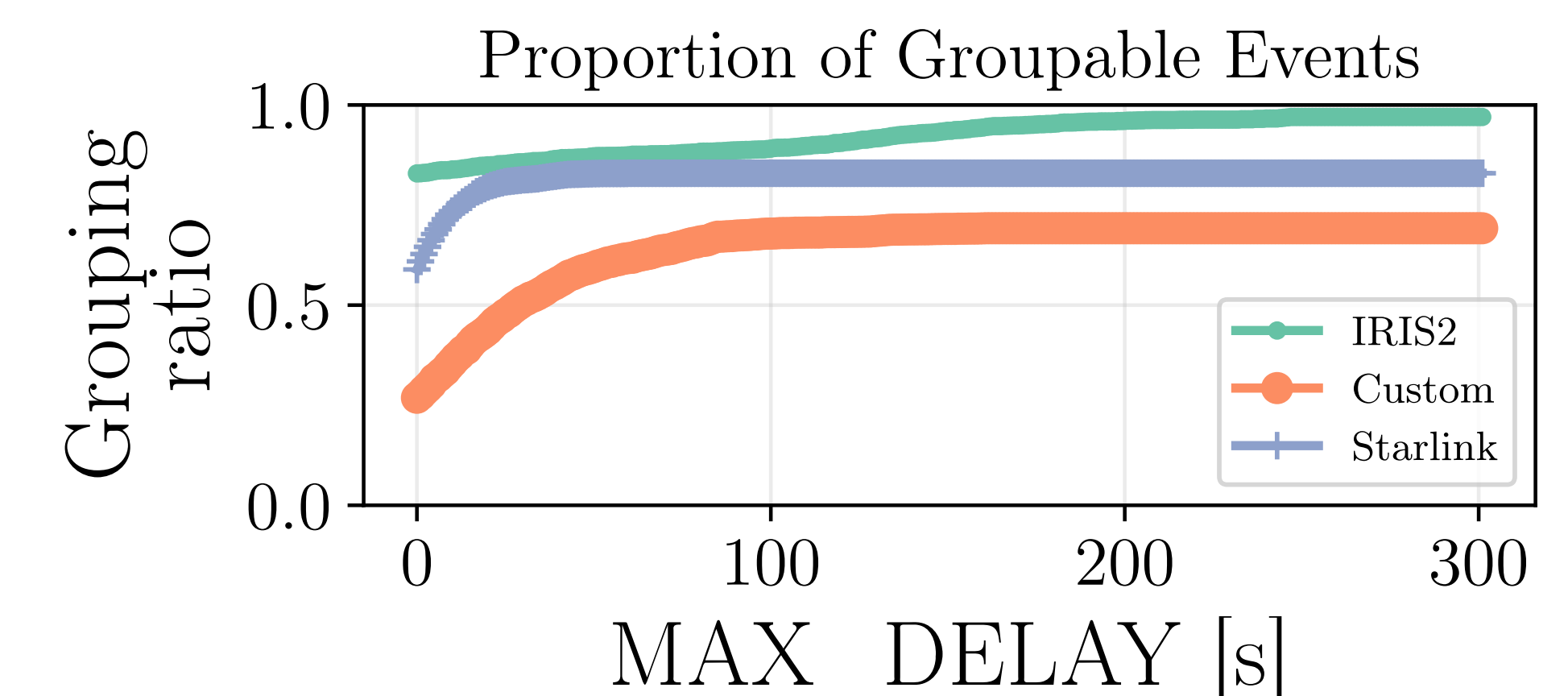
Evaluation

For Starlink, half the GS benefits from an increasing delay up to 40s.



With 300s of max delay, most additions are only delayed by a few seconds.

The max delay should be chosen w.r.t. the constellation.



References

- [1] Caleb Henry. "Europe Signs Contracts for IRIS² Constellation". In: *SpaceNews* (May 2025). URL: <https://spacenews.com/europe-signs-contracts-for-iris%C2%B2-constellation/>.
- [2] Maxime Piraux and Juan A. Fraire. *A code to describe satellite constellations*. IETF Draft. IETF, Mar. 2026. 13 pp.
- [3] Gregory Stock, Juan A. Fraire, and Holger Hermanns. "Distributed On-Demand Routing for LEO Mega-Constellations: A Starlink Case Study". In: *ASMS/SPSC 2022*, pp. 1–8.