WP 3.2 of the project OPTICAL WIRELESS SUPERHIGHWAYS

DISTRIBUTED CONTROL FOR HIGHLY RELIABLE COMMUNICATION IN FREE SPACE OPTICAL SATELLITE NETWORKS

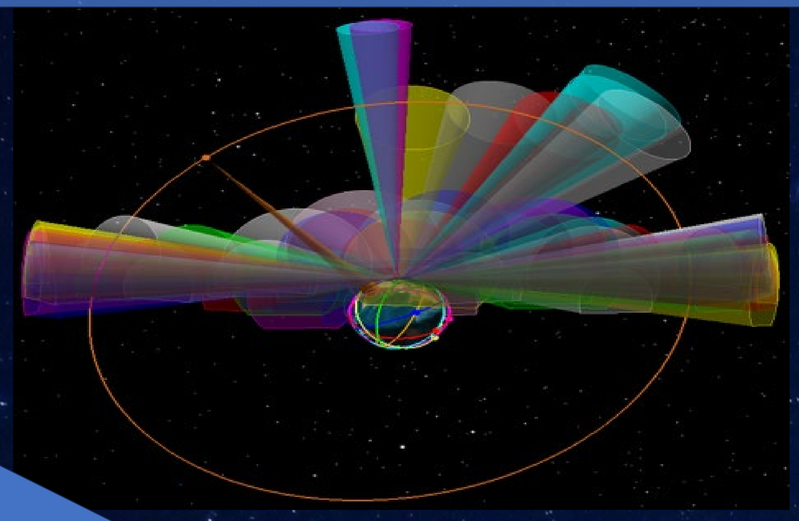
Schisin Ndongson, Alessandro Chiumento, Geert Heijenk.
University of Twente

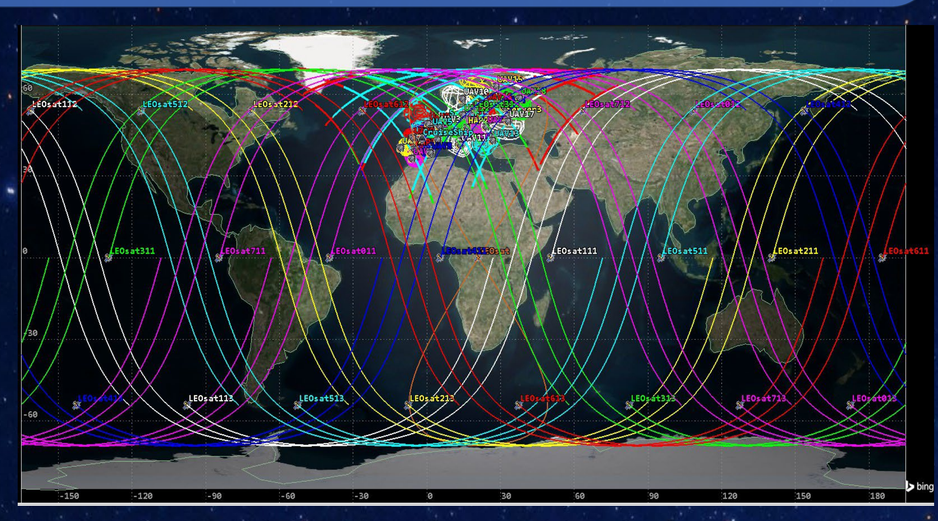
Abstract

We investigate how node mobility and varying weather conditions impact the dynamic nature of FSO-SN compared to RF-SN. Specifically, we quantify the topology change rate, crucial for assessing the efficiency of routing algorithms. In a stable network, routing algorithms must converge faster than the rate at which topology changes occur. Moreover, we analyze the effect of weather conditions on the maximum achievable data rates of both FSO-SN and RF-SN technologies. By evaluating practical values, this analysis offers valuable insights into the (potential) adaptability and resilience of these networks in real-world scenarios.

Features of Free Space Optical Spatial Networks (FSO-SN)

- High data rates
- Line of sight requirement
- More security
- Node degree limitation
- Acquisition tracking and pointing delays
- Network dynamicity
  - Node mobility
  - High vulnerability to weather impairment





Research Question

How can the software-defined approach be effectively implemented in an FSO-SN to address network complexity and topology change for efficient routing and optimized network stability and performance?

Fast Topology Change Rate due to high mobility of FSO-SN nodes and high vulnerability of FSO to weather impairment.

Network instability due to forwarding rules not reflecting the actual state of the network.

Phase 1

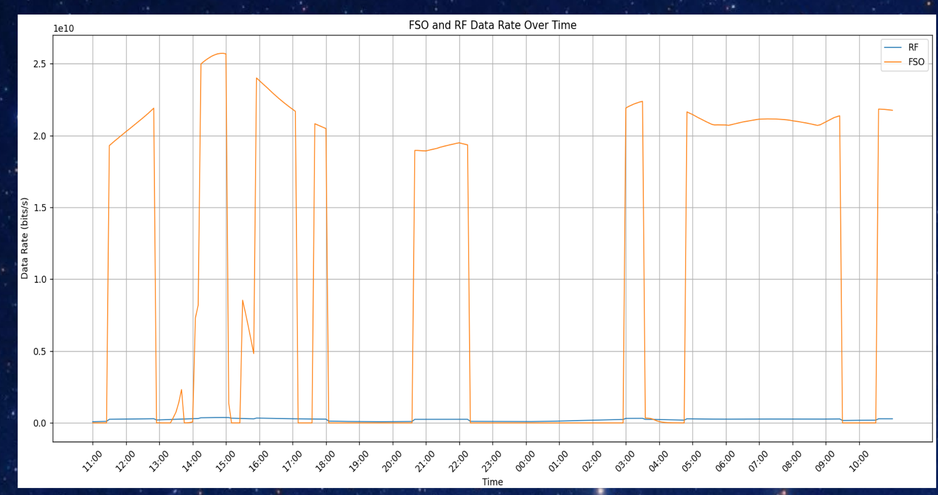
Comparative analysis of FSO-SN and RF-SN.

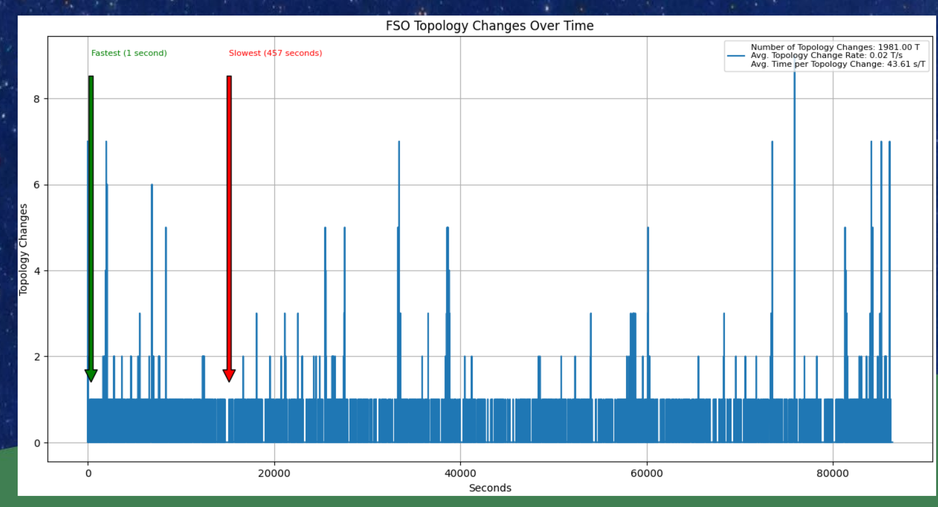
Phase 2

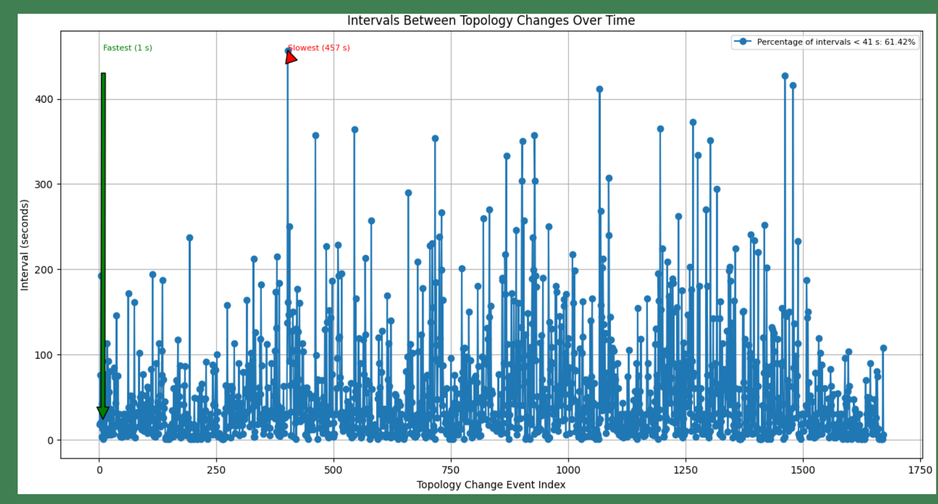
Link selection mechanism.

Phase 3

Software-Defined Weather and mobility-Aware Routing.







This *work is part of the project FREE - Optical Wireless Superhighways: Free photons (at home and in space) (with project number P19-13) of the research program TTW-Perspectief which is (partly) financed by the Dutch Research Council (NWO).*

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