Decentralized Cooperative Trajectory Estimation for Autonomous Underwater Vehicles

Liam Paull[1,2], Mae Seto[2,3] and John Leonard[1]

[1]MIT CSAIL, [2]University of New Brunswick, [3]Defense R&D Canada

Challenges and Potential Benefits

Challenges:

- High latency
- Low bandwidth
- Unacknowledged (broadcast)
- Unreliable

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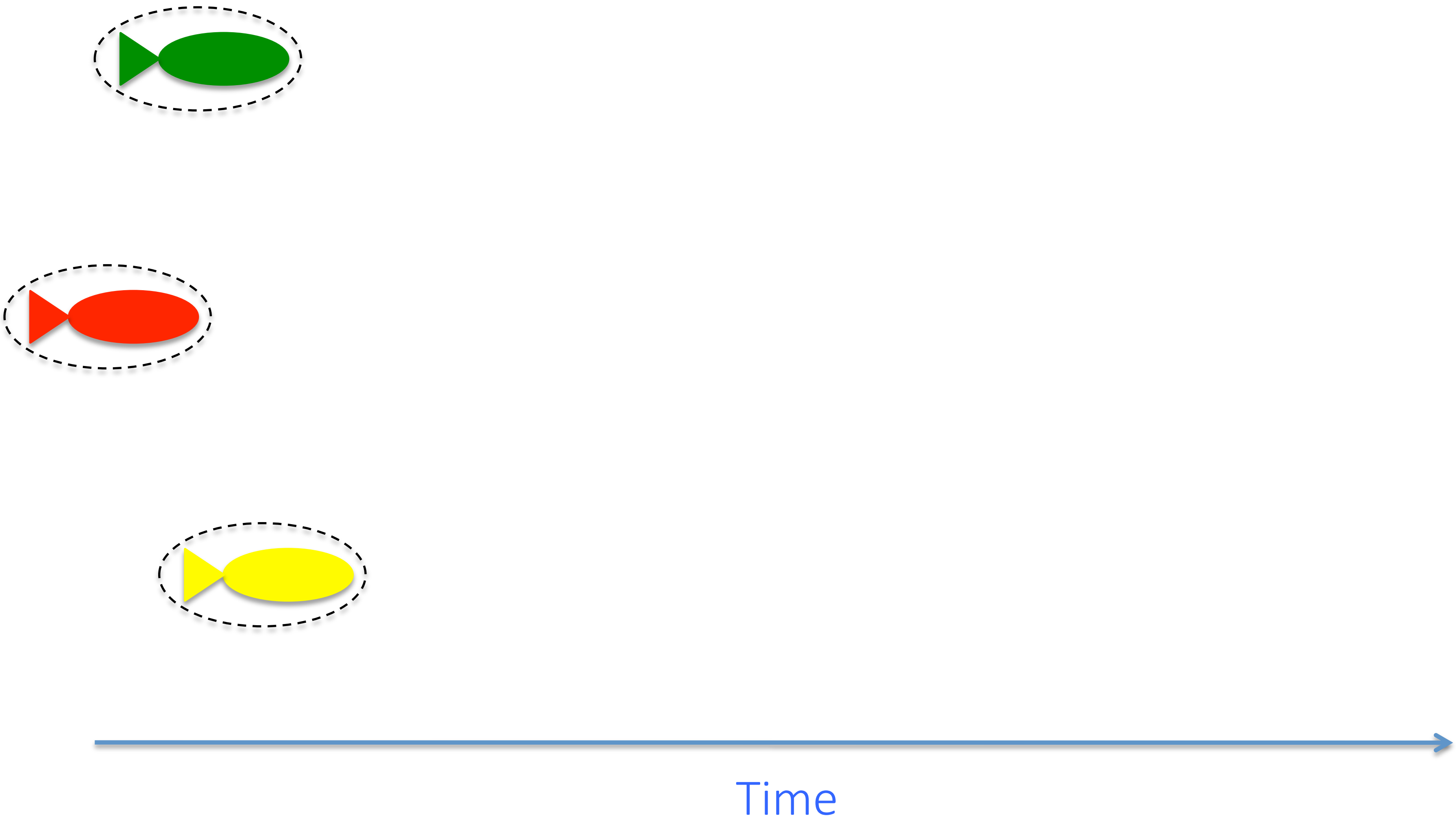
Potential Benefits:
- Vehicles surface for GPS fix less frequently
- Collected data more accurately localized through trajectory smoothing

Underwater Cooperative Localization



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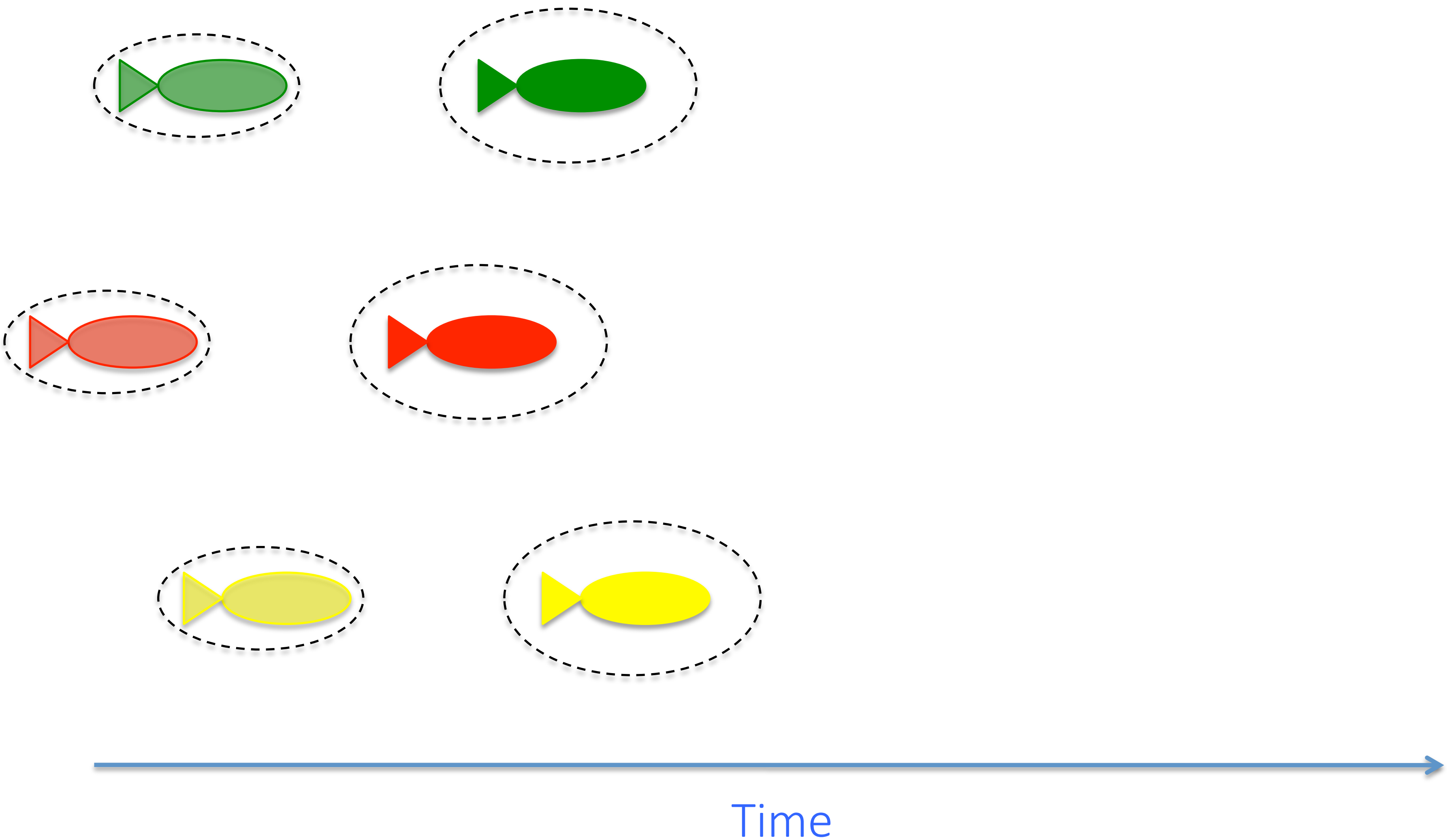

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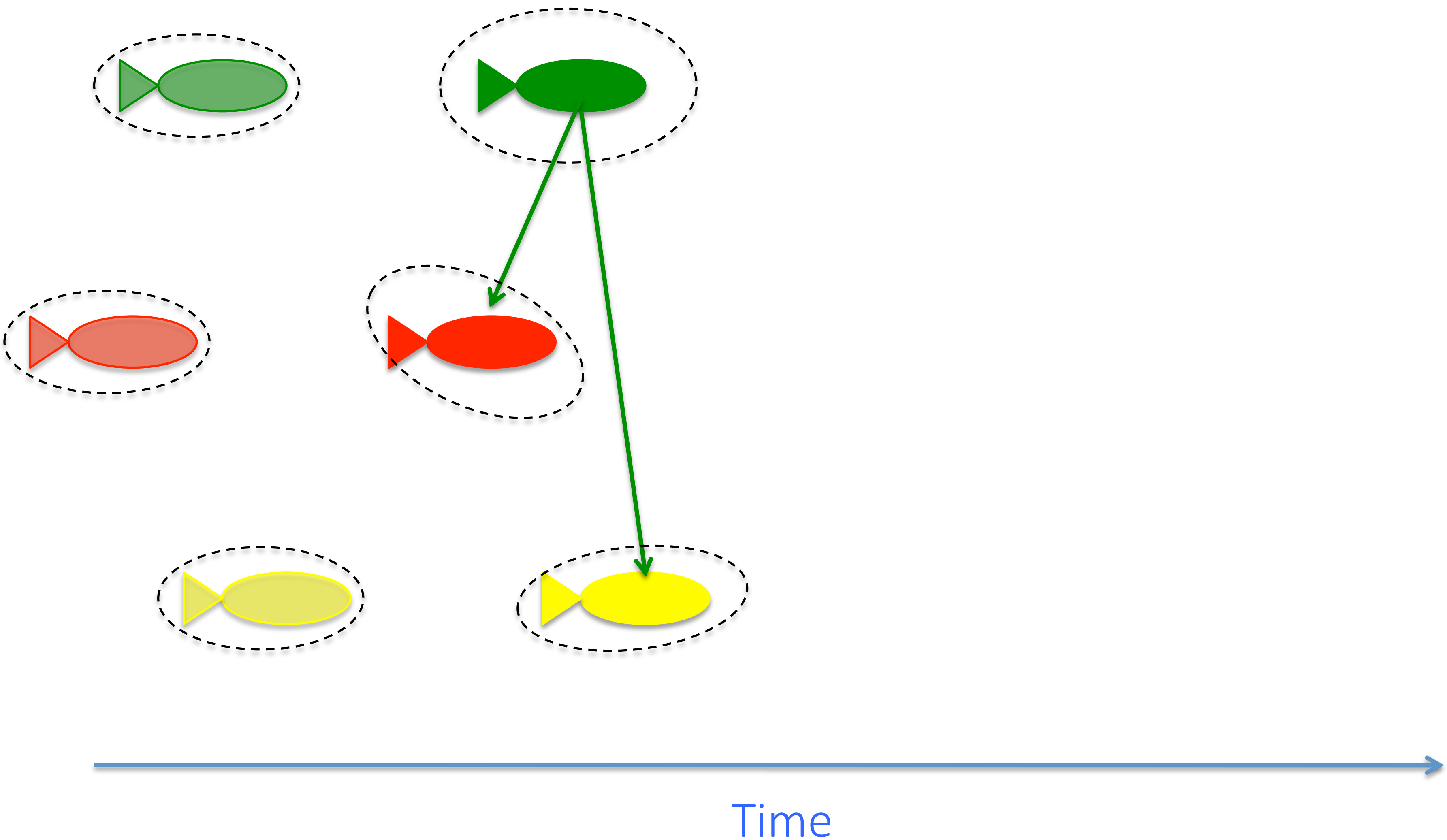

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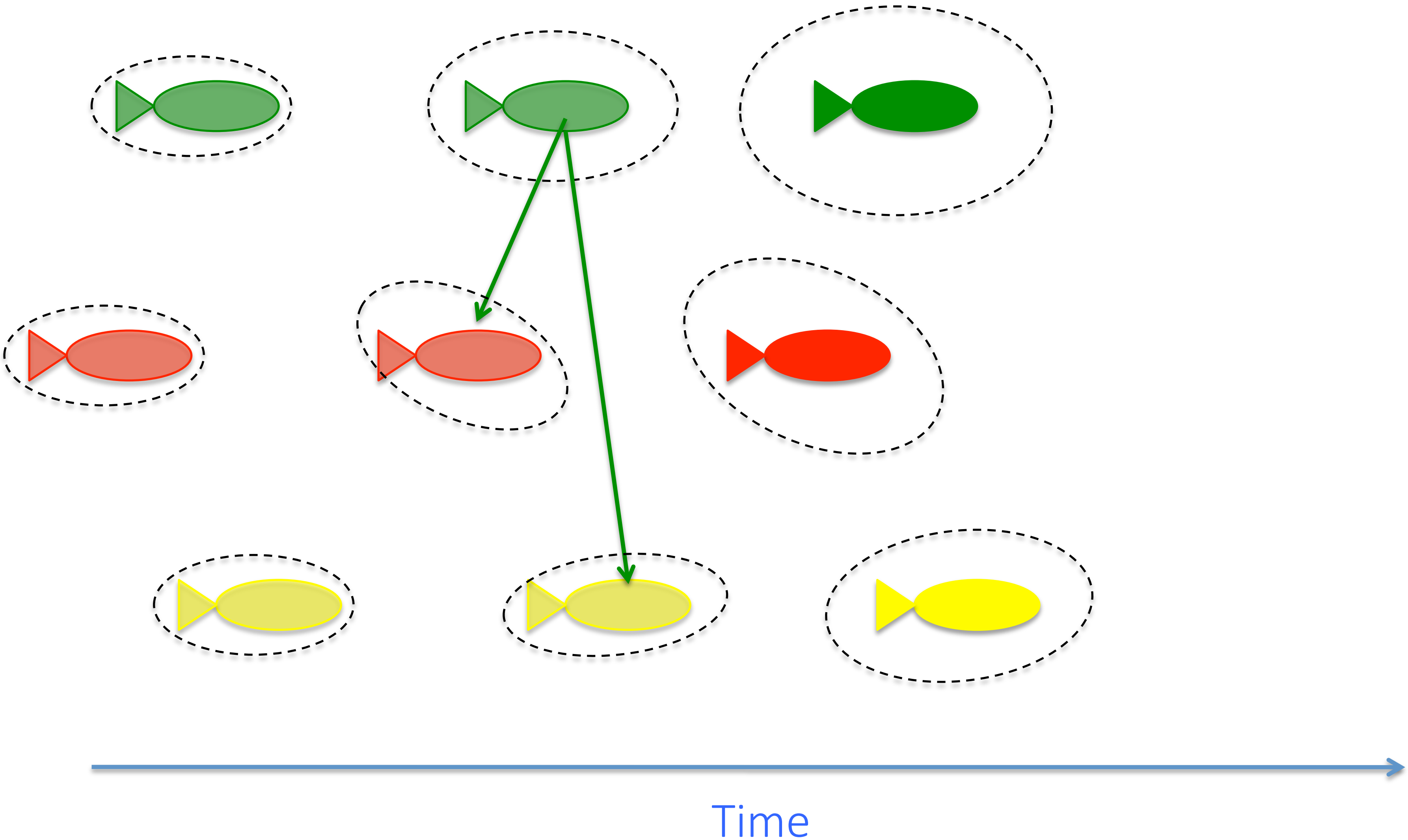

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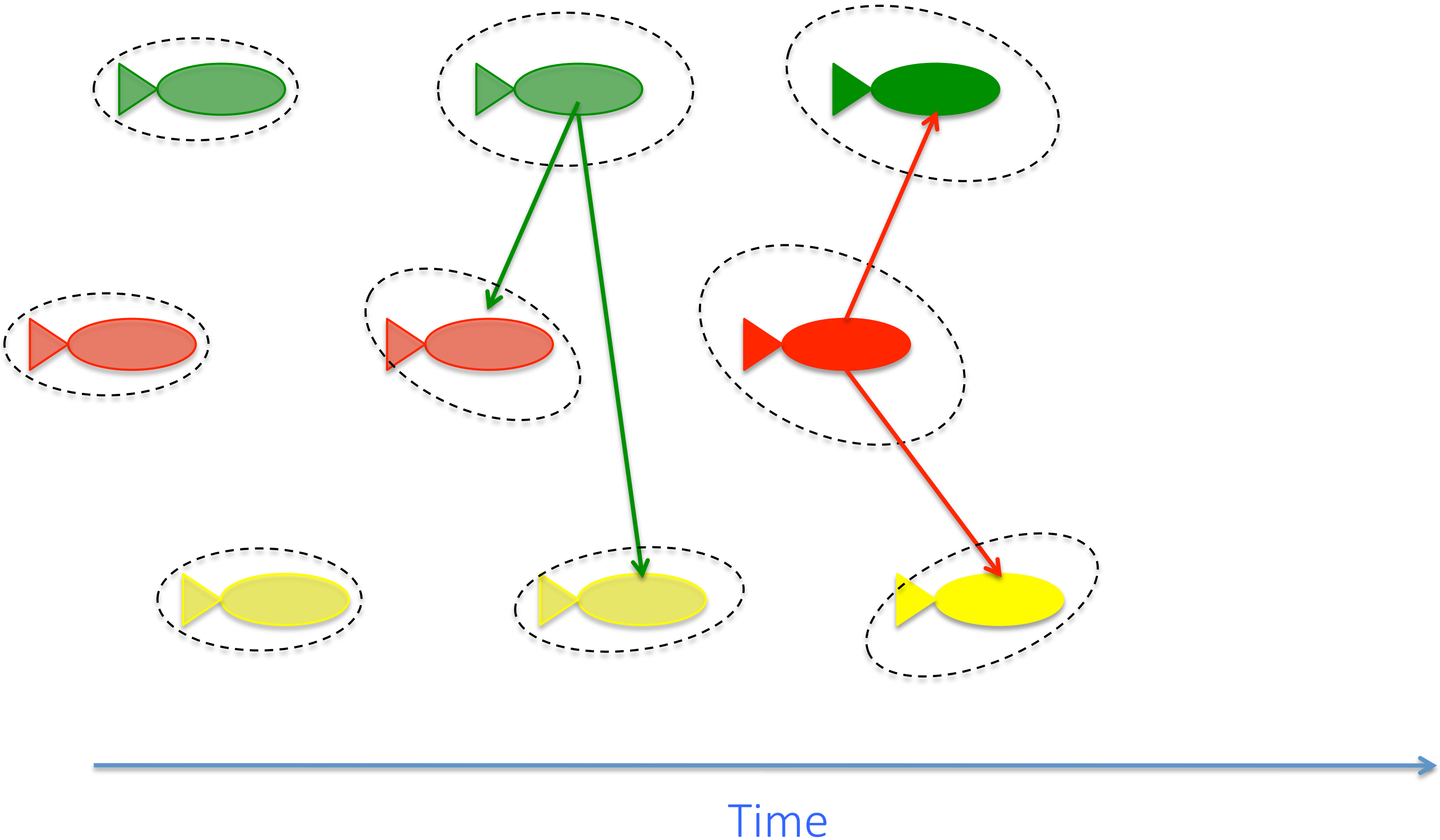

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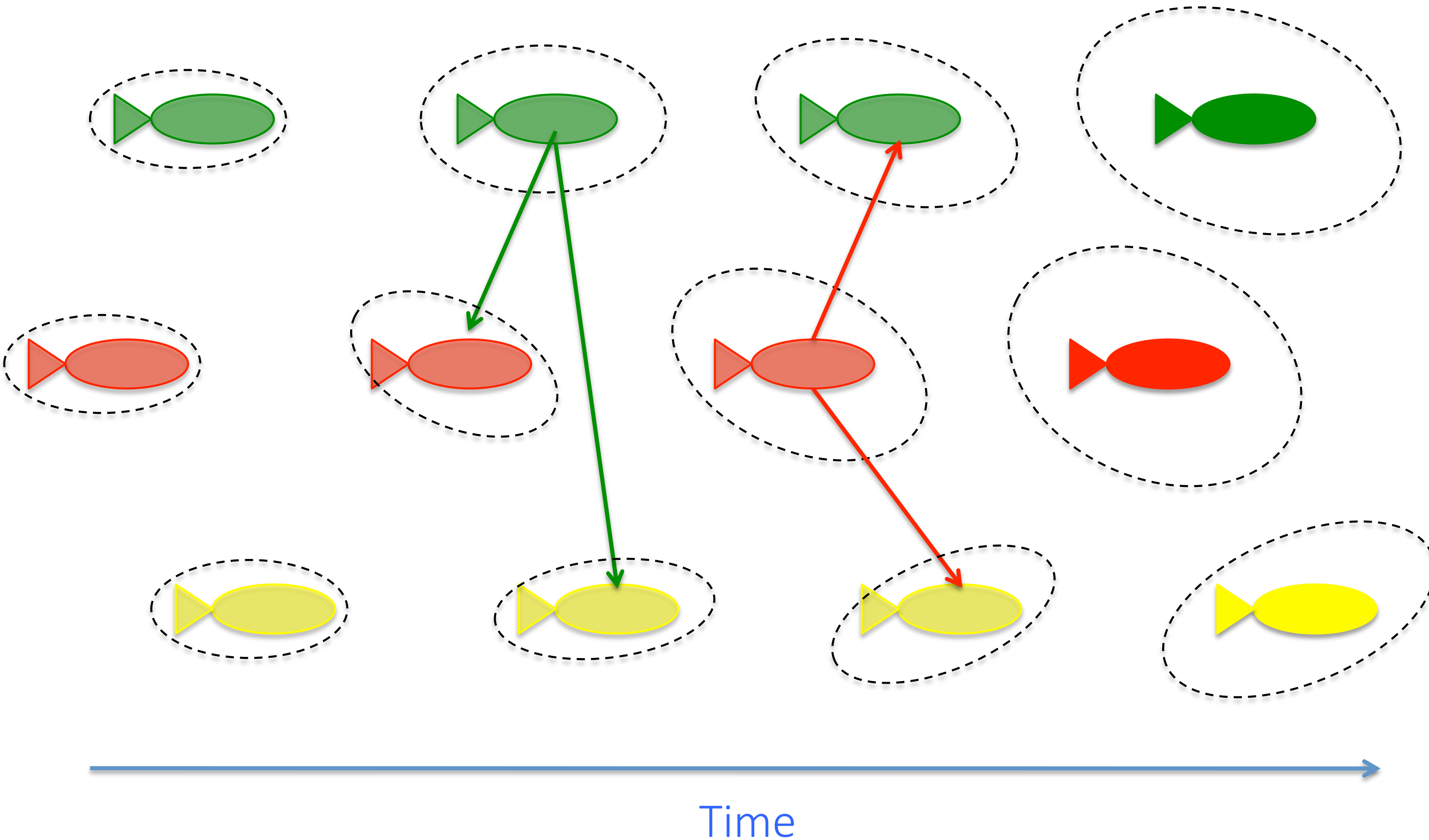

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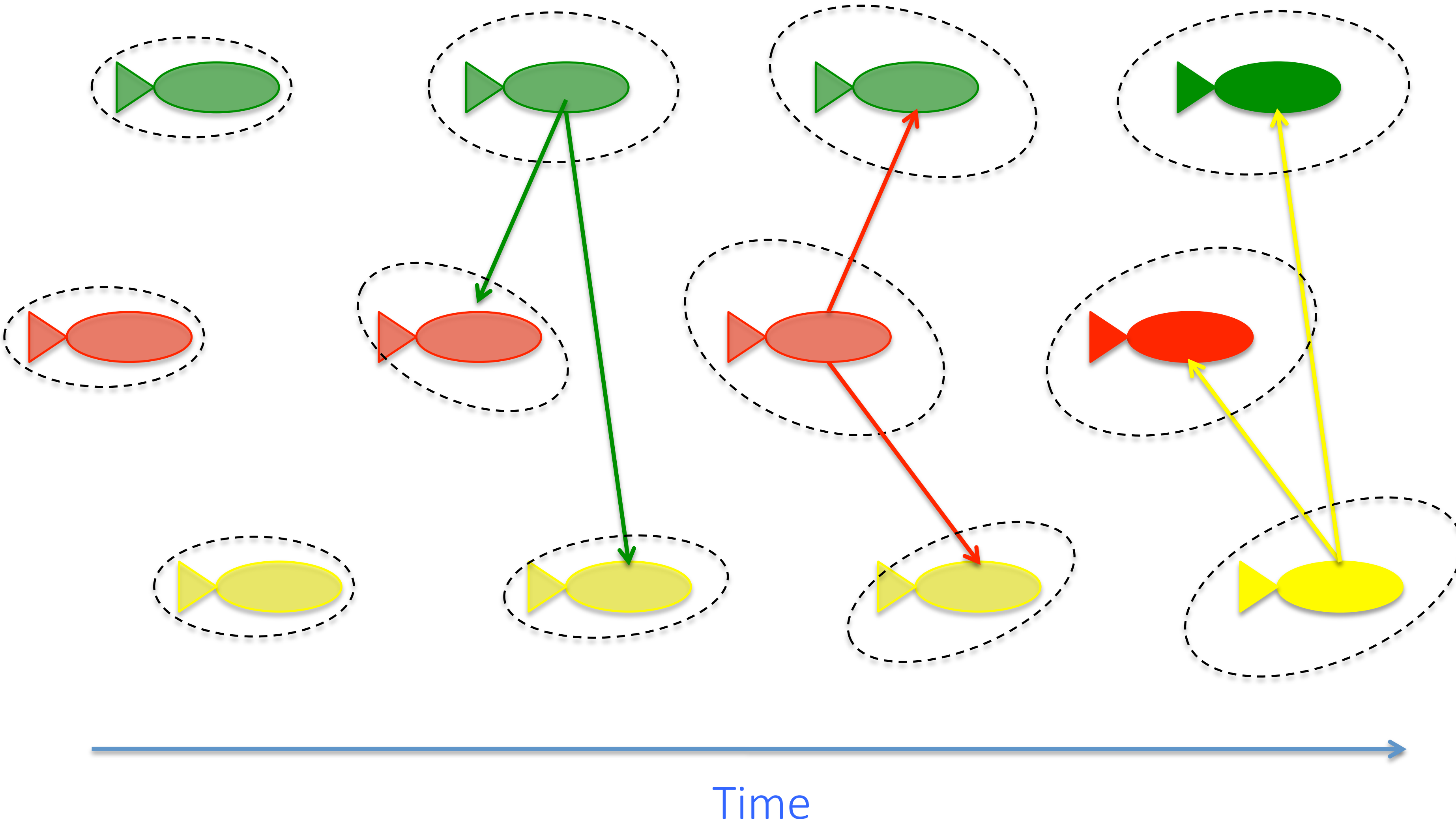
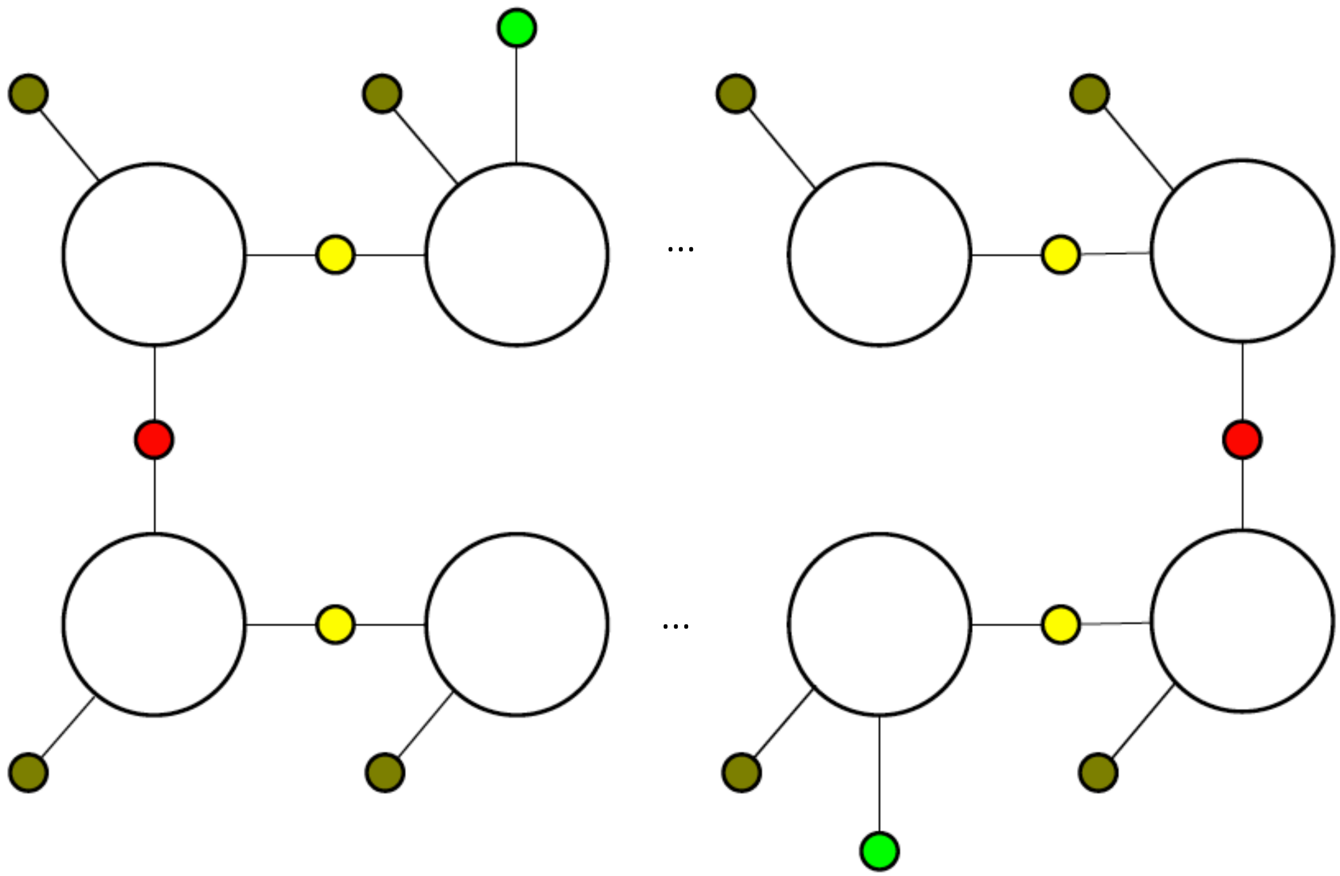


Centralized Multi-AUV Pose Graph



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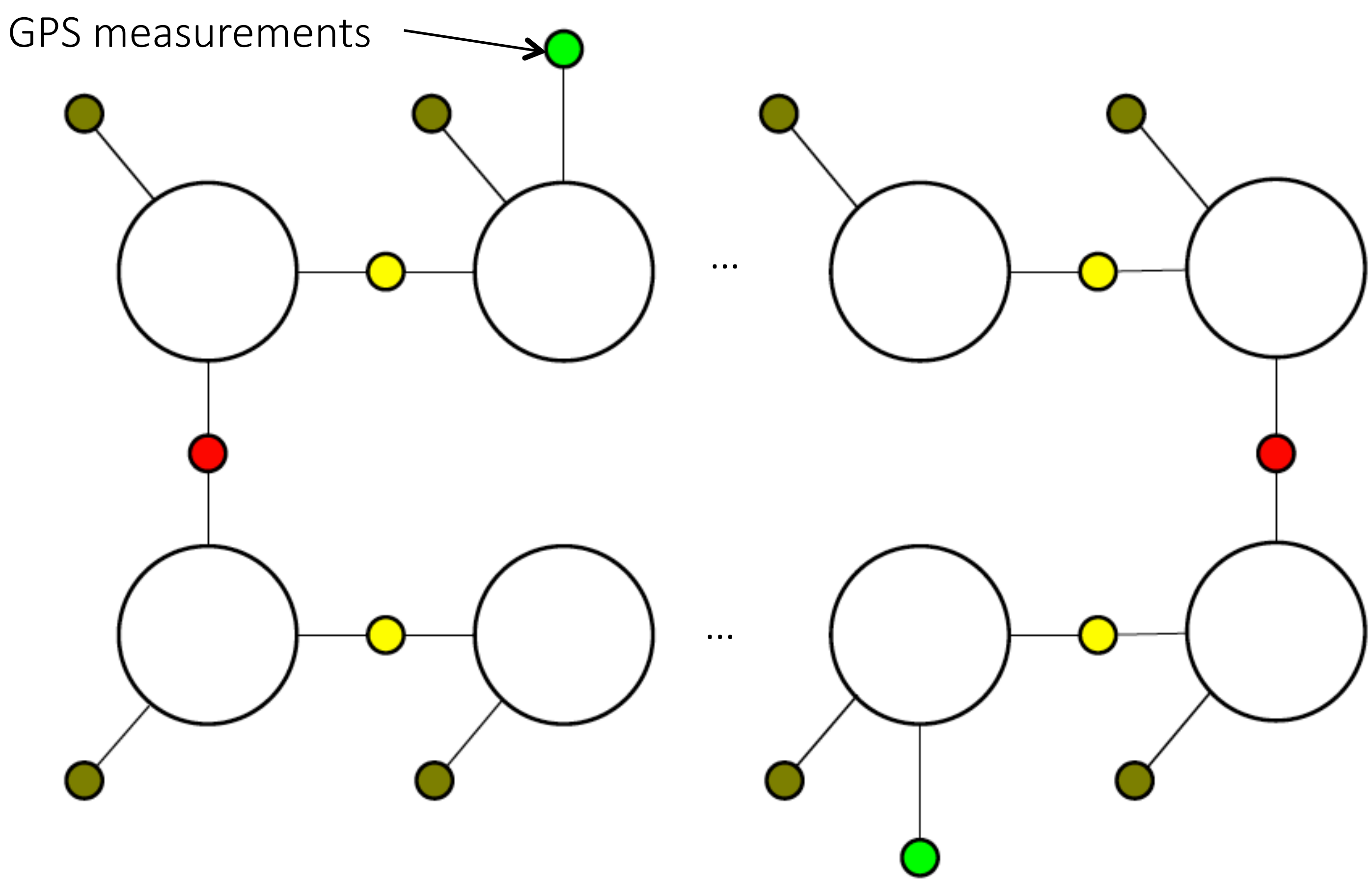

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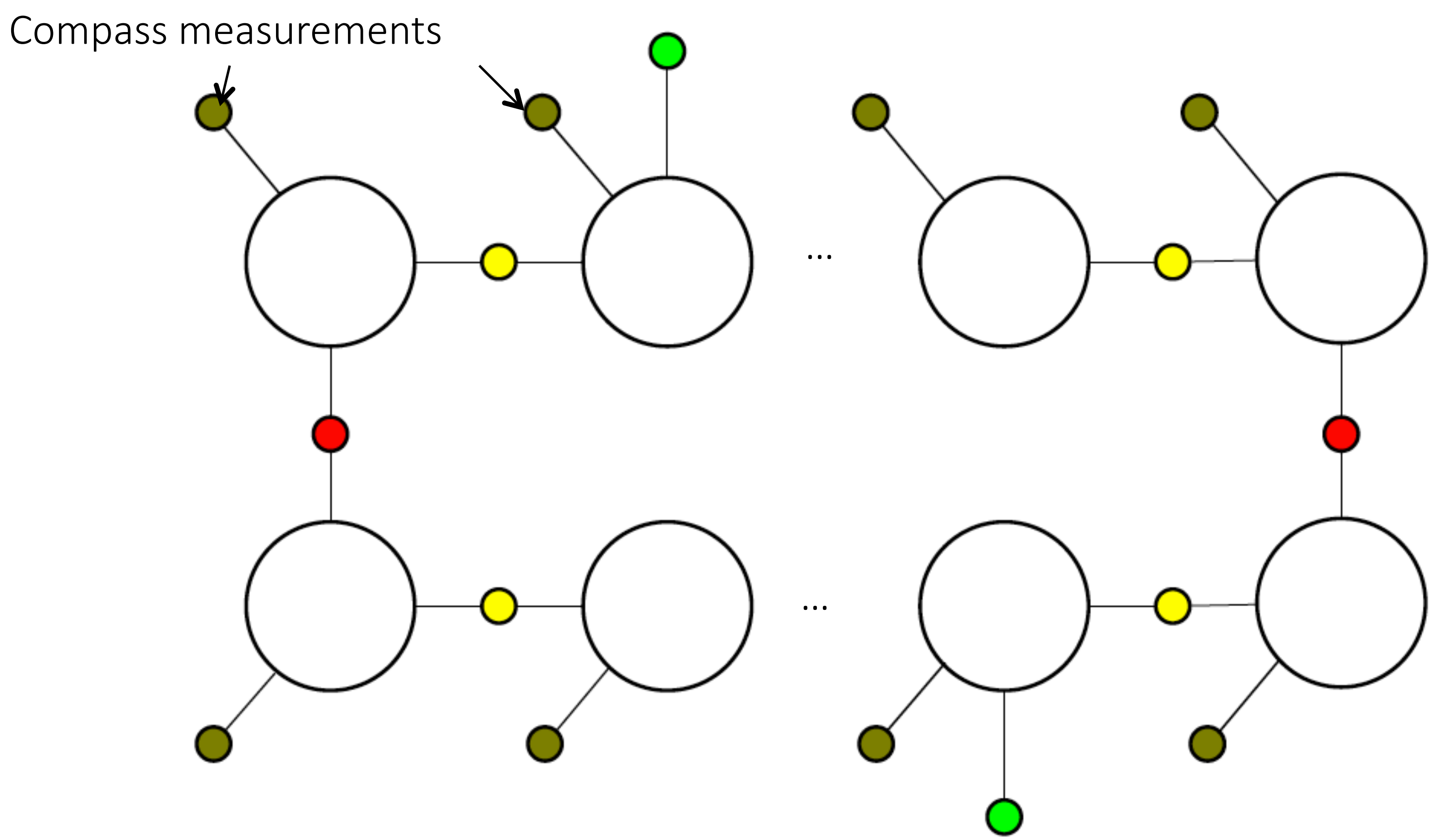

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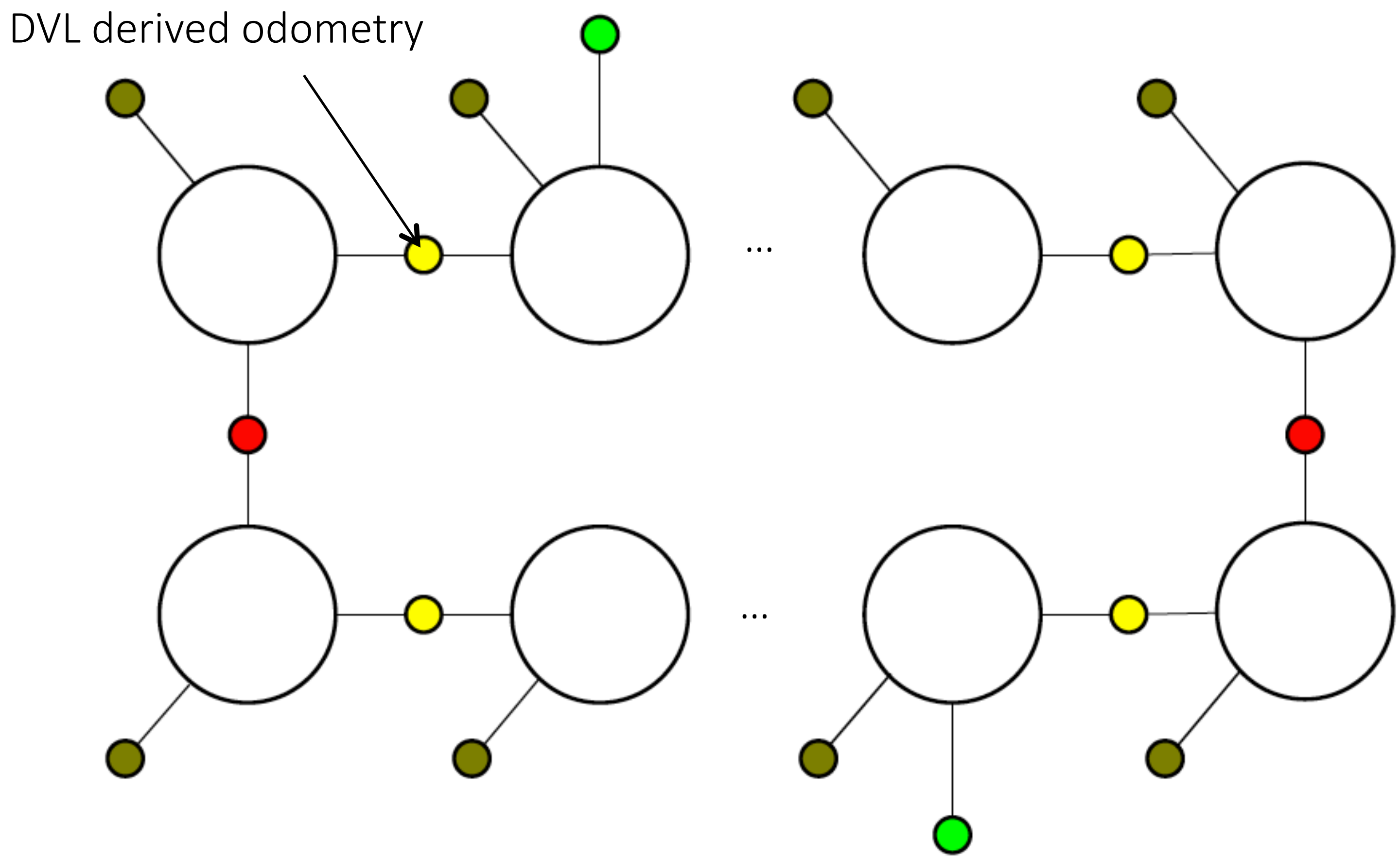

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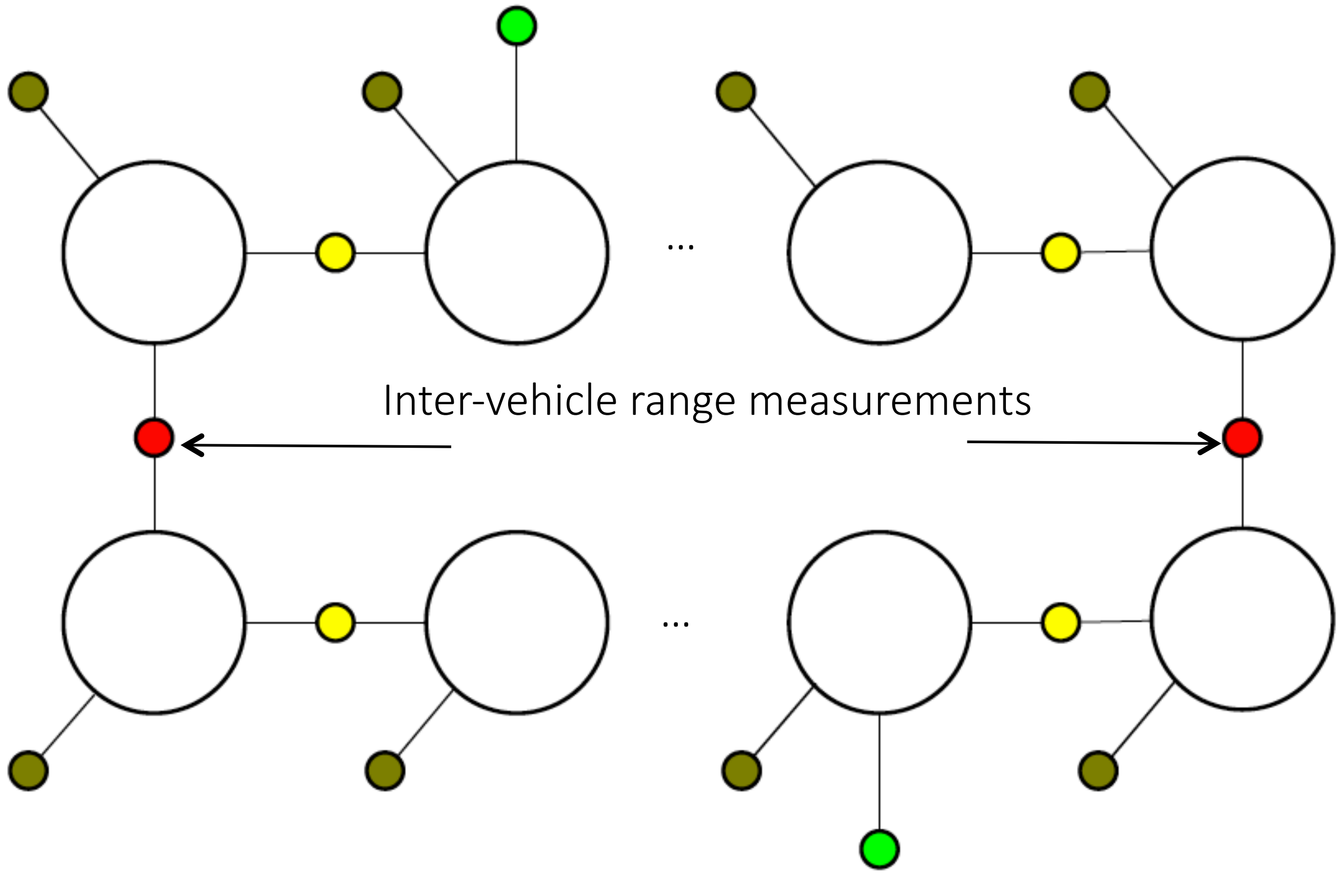

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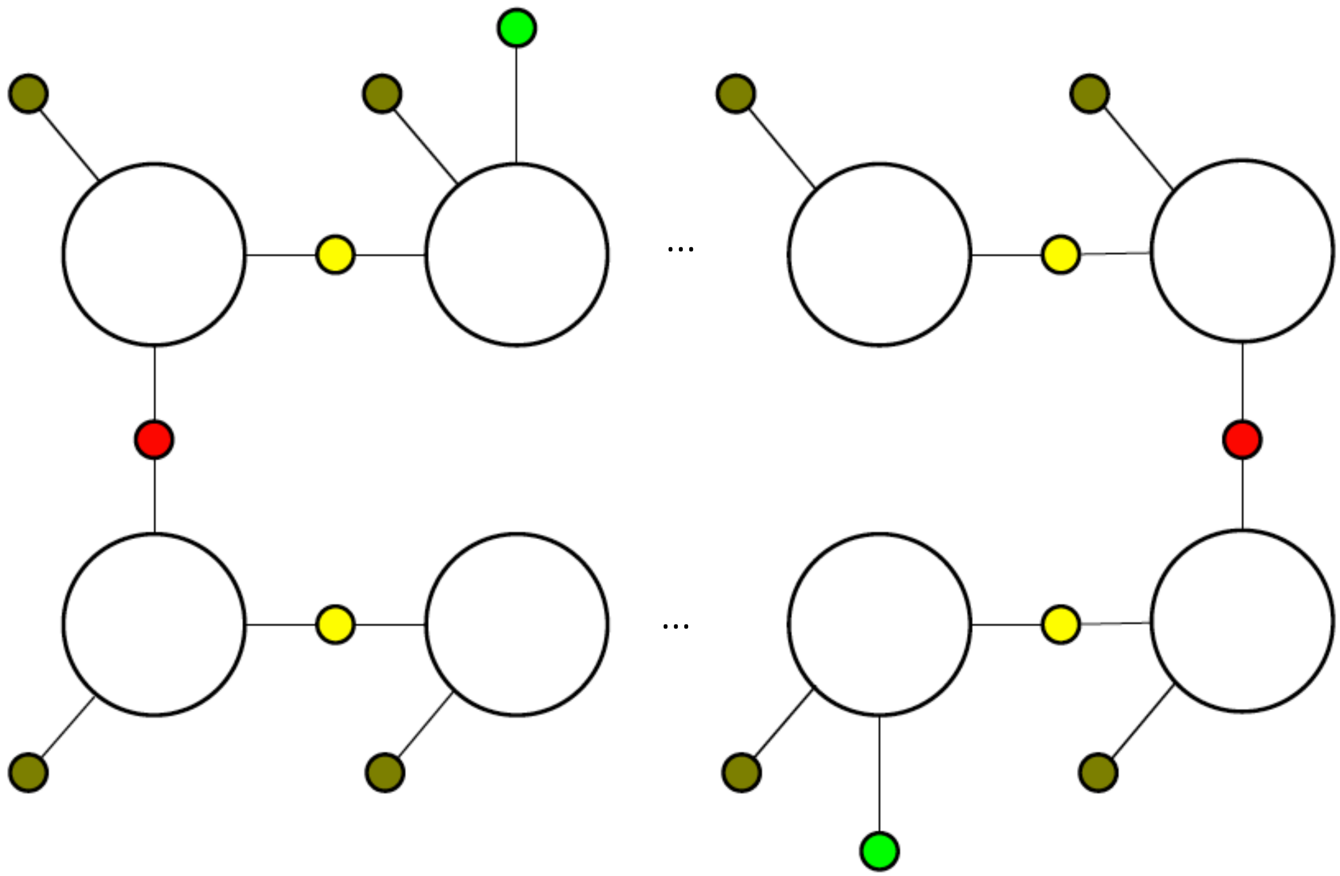
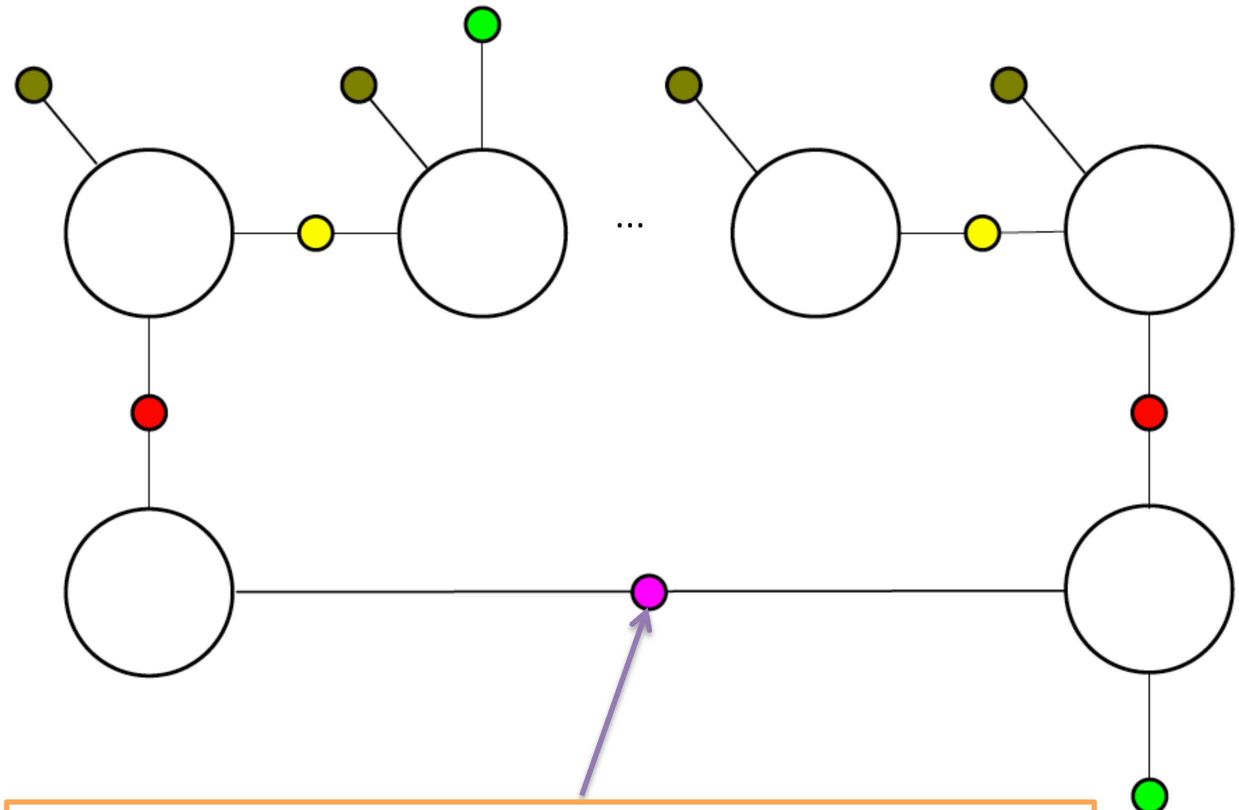


Problem: Too much data to send through Acomms

Decentralized Multi-AUV Pose Graph

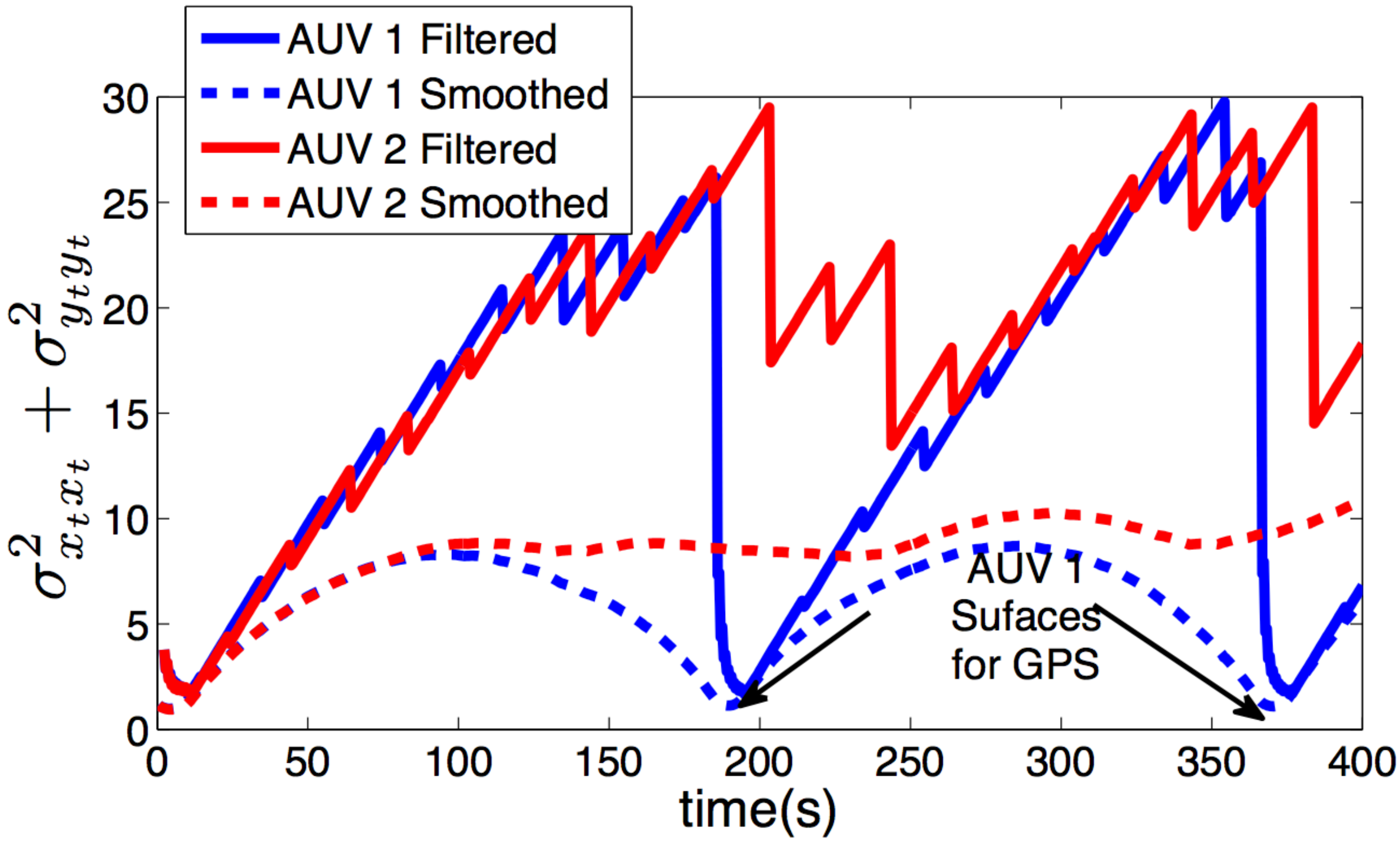


New factor connects other vehicle nodes at times of contact

Advantages of Proposed Approach

- Guaranteed connectedness of pose graph
- Data throughput scales linearly with team size
- Data throughput constant with time
- No requirements on team hierarchy

2 AUVS, One Surfacing for GPS



Different Packet Loss Rates