A Sharding Blockchain-based UAV System for Search and Rescue Missions

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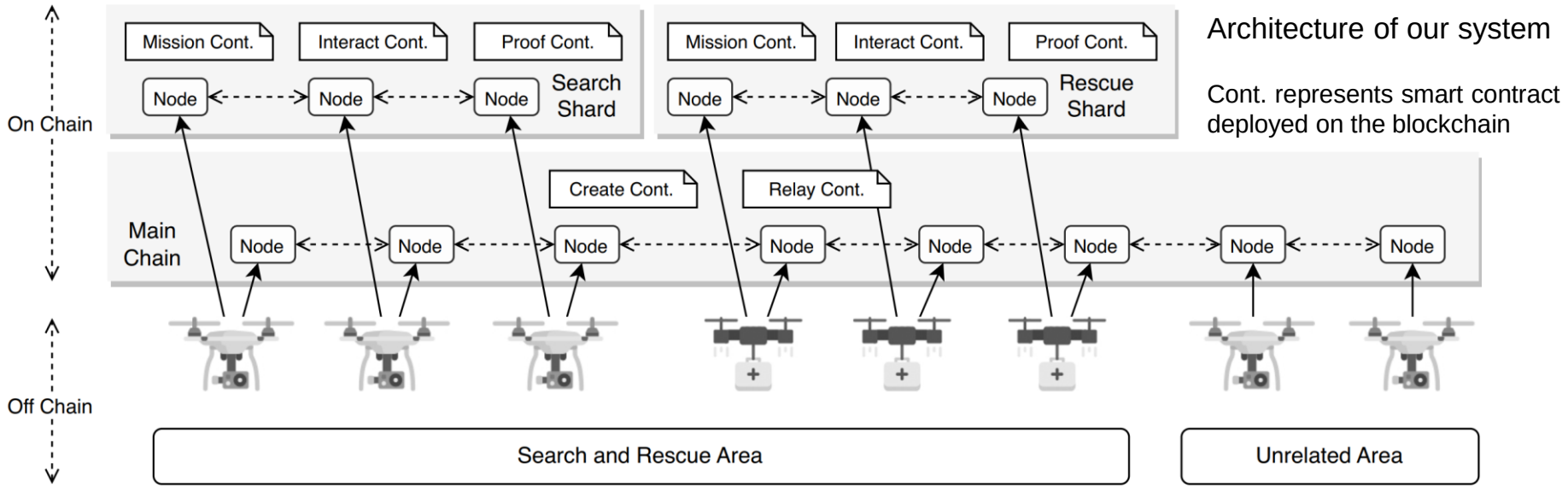
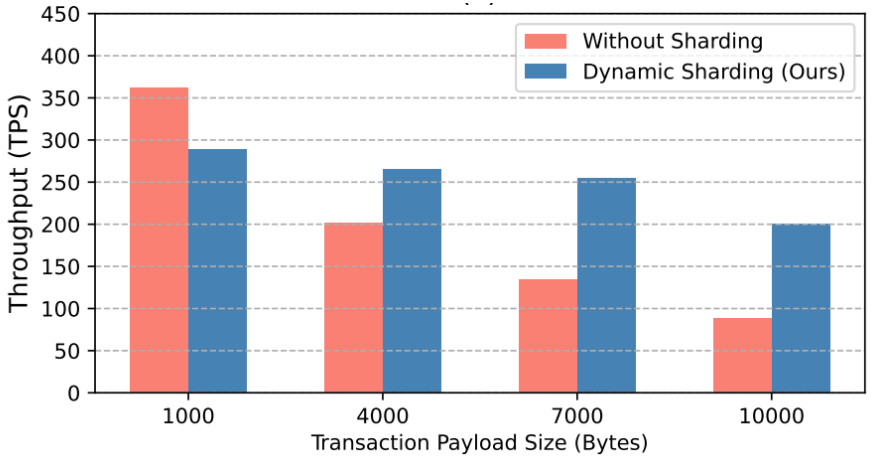
Problems & Ideas

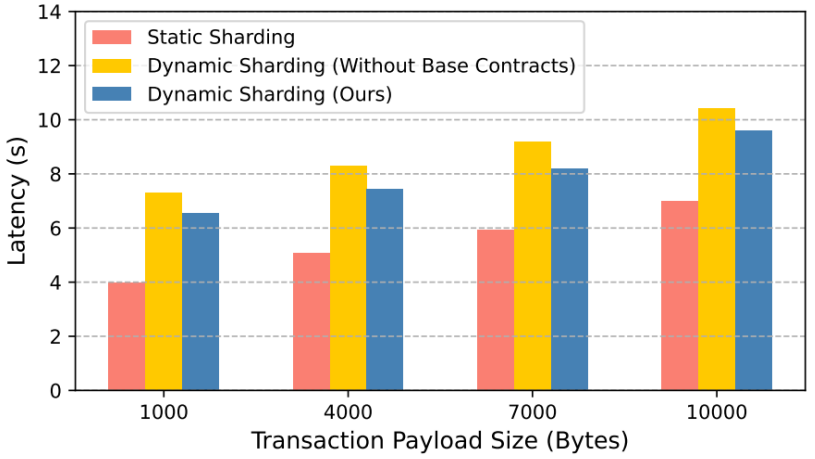
- Problems of existing sharding-based UAV systems in SAR scenarios:
  - *Adaptability*: difficult for the blockchain, serving as the basis of the UAV network, to adjust to the changing situations and the missions.
  - *Interoperability*: difficult for missions (deployed as smart contracts) that are distributed among shards to cooperate and coordinate.
- Ideas: Introduces dynamic sharding mechanism, which improves adaptability by dynamically creating mission-exclusive shards, and improves interoperability by supporting calls between smart contracts of different shards.



Main Contributions

- Contributions:
  - Tackle the scalability issues in blockchain UAV SAR systems by sharding;
  - Develop the mechanism of dynamically creating shards for specific missions to improve the adaptability;
  - Establish Merkle proof-based cross-shard interaction for smart contract calls to improve the interoperability;
  - Evaluate the performance of our sharding strategies through simulation experiments, and the throughput and latency outperform non-sharding approaches.





Comparing performance with non-sharding and other sharding approaches. Left: the throughput of non-sharding approaches and our system. Right: the latency of a complete sharding process of other sharding approaches and our system.