Quantum Cooperative Airspace Traffic Simulation (Q-CATS)

Problem Addressed

- **Airspace Gridlock**: by 2035 increased UAS/AAM operations will crumble current traffic deconfliction approaches.
- Need for scalable, real-time traffic deconfliction simulator for testing various deconfliction strategies.

Technical Landscape

 Current Simulations use simple heuristics that offer suboptimal traffic deconfliction and poor scalability.

Objectives



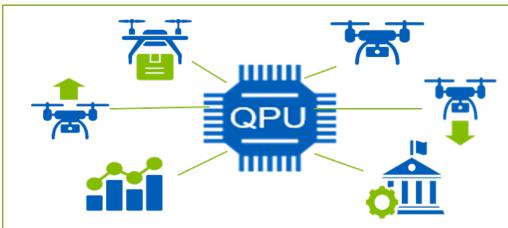
Develop QUBO algorithms to leverage quantum annealing.



Enhance simulation by implementing agent-based-modeling pipeline and ensuring USS interoperability.

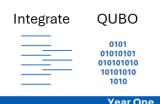


Distribute Q-CATS to operational stakeholders.



Leveraging quantum resources enables Q-CATS to scale with future xTM demands, enabling government and industry stakeholders to solve tomorrow's airspace problems:

- State DOTs planning new AAM vertiports.
- Municipalities considering new UAS operators.
- FAA evaluating USS deconfliction.



Quantum Annealer





Phase 1 Metrics

- QUBO algorithm
- 10x decrease in simulated UAS cancel/delays

Phase 2 Metrics

5,000 quantum optimizations
<1min

Phase 3 Metrics

Q-CATS validation via 2-3 pilot programs

Year Three

Phase 4 Metrics

- Scale to operational densities
- 5,000 quantum optimizations <30sec