

# Autonomous Mobile High-Performance Computing

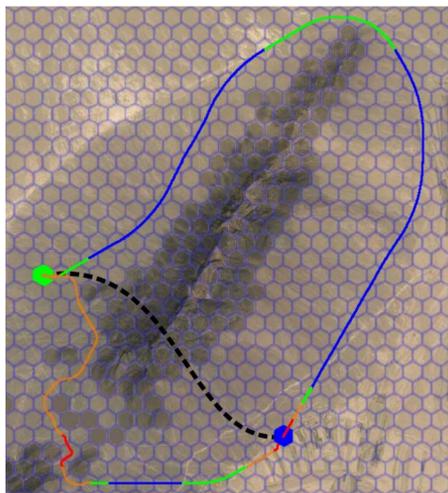


S&T Campaign: Computational Sciences  
Advanced Computing Architectures

Brian Rapp, (410) 278-4542  
brian.m.rapp2.civ@mail.mil

## Research Objective

Connect Soldiers to High-Performance Computing (HPC) via a tactical cloudlet, and move the HPC asset autonomously to maintain its maximum availability.



The HPC vehicle must navigate around rough terrain to maintain contact with infantry as they follow the dashed line.

## Challenges

- The complexity of finding an optimal path increases rapidly with map size and resolution.
- High-performance computing must be obtained using the vehicle's limited electrical power.



The consequences of choosing a wrong path can be severe.

## ARL Facilities and Capabilities Available to Support Collaborative Research

- Accelerator-based systems targeting maximum performance
- Low-power systems demonstrating exceptional efficiency
- Algorithm development for navigation and obstacle avoidance
- Brian Rapp, Song Park, and Dale Shires, "Path Finding with Variable Speed and Turning Radius," IEEE Military Communications Conference (MILCOM), 2014.



## Complementary Expertise/ Facilities/ Capabilities Sought in Collaboration

- New approaches to optimization of Model Predictive Control problems
- Parallelized implementations of non-linear optimization
- Advanced hardware suitable for mobile computation

